The Builder.

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The Works at Alnwick Castle.

CONCERNING the works at Alnwick Castle, two striking and important facts combine to give them interest to the professional world. In the first place, two distinct styles of art — the one English, the other Italian, have been blended in the adornment of one edifice. In the second, because it is asserted that the cinque-cento art thus used is now for the first time introduced, in all its purity, into England. As the last work of the great Canina, who, with rare enthusiasm, ventured to journey from Rome to Alnwick after he had long passed the three score years and ten allotted to man's existence, these restorations will have a separate story.

We have already sketched an outline of the history of Alnwick Castle. We will now add an account of the progress of the new works. It will be remembered that the noble owner, his Grace the Duke of Northumberland, had resolved that the external character of the building should be handed down to posterity in all its pride of donjon, towers, barbican, and moat; and that the interior was to present a palatial aspect, with decorations of the cinque-cento period of Italian art. To this end Mr. Salvin was entrusted with the exterior. The internal decorations were submitted to the Commendatore Canina, and Mr. F. R. Wilson was appointed to superintend both works. The contract was taken by Mr. George Smith, of Pimlico, who, over a space of nearly six years, including the trying time of the London strikes, successfully carried on this considerable undertaking. Operations were commenced in October, 1854, by pulling down a tower to make room for the main feature of the additions—the Prudhoe tower. The sky line of the castle had hitherto been flat and tame: the new tower was to rise 20 feet above the circle of towers, of which the keep was composed, and form a massive central object. In pulling down the condemned tower, some ancient window-heads were met with between the ashlar and the internal surface; and, soon afterwards, the black glass bottle, containing the parchment scroll mentioned by Professor Donaldson in his paper read to the Institute.

The word was quickly passed among the trades, that the old castle, the pride of every Northumbrian, was to be restored, and applications for employment streamed in,—every local workman and tradesman being anxious to be associated with the repair of the ancient Percy's stronghold. In the course of the excavations for the foundations, the old Norman moat was discovered with which the keep had been defended, in addition to the curtain-wall with its towers and outside moat. It followed a regular curve, and possessed a battered retaining wall. The foundations of the new tower, 15 feet thick, were carefully laid down; and, on the 25th of November, 1855, the corner stone of the splayed base was laid by her Grace the Duchess of Northumberland. This ceremony was marked by the first of a series of annual commemorative dinners given by the duke to the workmen.

The walls of the Prudhoe tower gradually arose. Good freestone was to be had in abundance, in the moor quarries, not a mile distant from the castle; and sand was obtainable from the bank of the river which winds past the foot of the eminence on which the castle is built. The most particular regard was paid to preserve the character of the ancient masonry in the new work. It frequently happens that the prim smooth stone-work of a modern restoration stands out a blemish and a patch upon the bold irregular work of the men of old; but in this case, after a careful study of the peculiarities of Edwardian masonry, exact drawings were made giving the dimensions of every stone that was to form part of the new work,—hence we have a faithful reproduction of ancient masonry. The south-west front of the tower is ornamented by a large *alto-relievo* of the Hotspur banner, which has been sculptured by Forsyth; while at the north-east angle arises the new flag turret. Thirteen months after the foundation stone was laid, the flag was lowered from the old flag tower as the standard of St. George was hoisted on the new turret, amidst general congratulations and rejoicings, intensified by the fact that the day on which this ceremony was performed was an anniversary of the duke's birthday. The towers and turrets of the castle reverberated the salute of the cannon, Lurley-berg fashion; and the cold grey town was bright with flags, and hospitable with commemorative feasts.

Meanwhile the Italian studio was in full operation. Signor Montiroli, architect, accompanied by Signor Bulletti, the Florentine carver, had visited the works, bringing with him the designs for the ceilings of the state-rooms as approved by the lamented Canina, and accepted by his grace the duke. He proceeded to make upon the floor of each apartment, to which paper had been previously affixed, full-sized drawings of the carved coffered panellings intended for the ceilings. Thus instructed, Signor Bulletti commenced to carve in wood samples of the decorations determined upon. It was intended that, after inspection and approval of these specimens, he should return to Italy and their superintend the execution of the quantity required. But a carver, residing in the town, who was temporarily engaged to assist him, was found to imitate the models set before him with so much ease and precision that the first intention was abandoned, and it was resolved that the whole of the carvings should be executed in Alnwick by native talent under the guidance of Signor Bulletti. By the third year, after the commencement of the works, three of these ceilings,—the saloon, the drawing-room, and dining-room,—were perfected and fixed in their places. It was at this season that the lamented Canina visited this remote branchlet of his beloved art. Long will his venerable memory be associated with a sunny terrace walk, sheltered from the north by the castle walls, which he was frequently seen pacing with contemplative mien. With the English architect he could only exchange greetings by signs, neither understanding a sentence of the other's language; but with Professors Cockerell and Donaldson, who were also consulted at this time, he was able to communicate his impressions. Doubtless his sympathies were too entirely dedicated to the glories of the ancient Roman empire for him to feel much for the scenes of the Percy's prowess, although Sir Walter Scott's novels, translated into Italian, have rendered the Border and its history an attractive subject. The Commendatore brought with him, besides Signor Montiroli, Signor Mantovani, by whom the friezes were to be executed,—an artist already favourably known as having been entrusted with the restoration of Raffaelle's frescoes, in the famous Loggia, in the Vatican.

In the Italian specification, already published in this Journal, it was proposed to observe a certain progression in the decorations; that simplicity should reign at the entrance and that an increased richness should gradually prevail till it culminated in the state apartments. The grand staircase, 12 feet wide, is wrought of a fine white stone whinned on the craggy hills of Rothbury, where great blocks of it break through the green and purple crest of heather. It was no easy task to bring the first landing-stone, 12½ feet square and 14 inches thick, safely down this hilly country into the valley in which Alnwick is built; but it was eventually successfully accomplished. The staircase terminates in a vestibule, which is to be paved with marbles and adorned with paintings: thence, an antechamber admits the visitor to the principal apartments. The effect of the decorations is gorgeous: the minutely carved ceilings blazoned with gold and colour, the friezes rich in the ripe warm colouring of the south, the dados of choice woods inlaid in lozenge patterns, the marble mantel-pieces sculptured in Rome, produce a striking result. Looking upon one of the apartments the same flash of brilliant colouring is reflected on the eye as when standing before one of Turner's sea and sun pieces; but no reminiscence of the ancient Percies is recalled to the mind. And herein lies the gist of all that has been said about the re-modelling of Alnwick Castle. The identity of the building as the home of the chivalrous Earls of Northumberland, who fought and bled at Otterbourne, Bramham Moor, Towton, and St. Alban's, has not been preserved. The old Percy dining-hall, the Armourer's Tower, and the Falconer's Tower, have been successively sacrificed. Who cares how many times the gentle ladies of the house of Percy entered the Falconer's Tower on a visit to a pet merlin or a dying hawk? Who cares for the phantom knights who may have watched their disused armour hanging in the groined chambers of the Armourer's Tower? To accommodate the newly-arranged apartments to the Italian interior, the new Prudhoe Tower is built in such a position that the view from the windows would have been blocked out by these old towers: in consequence they are levelled to the ground.

The new range of kitchens is built, in disregard to Mediæval precedent, without the line of circumvallation. The principal kitchen has a stone groined roof, rising to a lantern, after the manner of the kitchens at Fontevrault, Chartres, and Glastonbury; and the stone fireplace is treated in the same Mediæval manner. Modern contrivances for culinary operations have been freely adopted; Messrs. Feetham, of London, having furnished stoves, ovens, and gas and steam apparatus of the most approved description. The numerous larders and sculleries have been conveniently placed on one level; and hydraulic lifts from the kitchen to the principal floor also combine to save unnecessary labour: these latter are the engineering works of Messrs. Easton & Amos.

The decorations of the ceilings of the state bed-rooms are of plaster, cast from models made by Signor Taccolozzi for the purpose. Messrs. Earle, of Hull, furnished the cement used in these and other parts of the works.

The machinery and ironwork required in the building operations were furnished by Messrs. Hawks & Crawshay, of Newcastle, with the exception of the immense girders and joists for the fireproof floors, which were provided by Messrs. Barrett, of the Adelphi. Some acres of lead were laid on to the roof by Messrs. Wilkin & Dickman, of Alnwick, who also manufactured the scores of copper and iron sashes and casements required. The local tradesmen were further employed on numerous other portions of the work. Mr. T. Robertson constructed the mechanical parts of the ceilings. The works are rapidly approaching completion, of which, when attained, we shall inform our readers in another paper.

THE ARRANGEMENT OF WAREHOUSES.*

HAVING seen Mr. Adams's warehouse, and learned his wise arrangements for the good of his hands, I naturally bethought me of looking into the condition of those warehouses in Manchester where females work. I was not previously aware of the great number of women who find employment in our warehouses at frill-making, cap-making, and the like, amounting, I am credibly informed, to several thousands. By the permission of various masters, kindly and frankly given me, I have looked through ten warehouses, employing about 1,100 women, and of these only two can be said to be commodious and well aired. In the work-rooms of four or five, the cubic air space per woman was excessively small, and the

* By Mr. John Roberton. See p. 459, *ante*.

atmosphere polluted by gas-stoves and gas-lights. In one of these warehouses I noticed a long low room of less than 4,000 cubic feet of air space, where sat fifty women, and in an adjoining room, of not more than 1,800 cubic feet, there worked twenty-four women; and the air space of the rooms in several of the other warehouses, with reference to the number working in them, was little if at all greater. The atmosphere in these was very bad: and when, in one instance, I expressed my surprise that a window was not kept open, my attendant replied that the inmates shut any window he might open as soon as he turned his back. On this I asked one of the women what made them do so; to which she answered, the place was so hot that an open window produced draughts such as nobody could endure. It is hardly possible for any one to imagine the incommodiousness of several of these warehouses, and the bad state of the atmosphere in the work-rooms, without paying them a visit; and a remedy for such evils is by no means easy. The reason is this: nearly all the buildings in Manchester in which women work were originally erected, not for warehouse purposes, but as dwelling-houses; and the work-rooms—once used as nurseries and sleeping apartments, perhaps—are now occupied by nine or ten times the number of persons they were originally meant to accommodate.*

What, it may naturally be asked, is the physical and moral condition of the women in these, for the most part, badly ventilated warehouses? I do not find that they work longer hours than in Mr. Adams's establishment; and they cease earlier than his hands on the Saturday. With respect to health, I noticed in many that sallowness of complexion which indicates a depressed state of vitality; but were it found that the health does not absolutely break down, this would make little in favour of the sanitary state of these warehouses. The female sex, when in the spring-time of life—between the ages of fifteen and twenty-five—bear up surprisingly under such causes of physical exhaustion as these; especially when, as in the present instance, they do not sleep on the premises,—the case in many of the London warehouses,—but walk night and morning to and from their own homes, which lie often at considerable distances.* Concerning their moral condition, I would speak with caution. Their position in this city is one, doubtless, of great temptation; and I know not that anything hitherto has been done by the masters for their moral or intellectual advantage. A friend, whose official duties make him familiar with the state of our lower classes, tells me that when trade is brisk the women's work-rooms are generally overcrowded; and being in most instances badly ventilated, a state of atmosphere is produced injurious to health, depressing to the spirits, and disposing to the use of intoxicating liquors, as well as to such excitements as the dancing-room and theatre. When work becomes scarce, some of them street-walk,—in hard times many do. This, it must be admitted, is not a cheering picture. If lodging-houses, factories, and print-works are thought to require inspection, these work-rooms, it will perhaps be conceded, equally demand it: assuredly this is a form of social evil which ought not to be overlooked.

Dismissing the subject of women's warehouses, I now venture a few remarks concerning those used for the country and shipping trades. And first, with respect to salubrity,—a point of no small importance, when it is considered that in some instances the number of hands, boys and men, in a warehouse reaches 250 and upwards. The build of a warehouse will, of course, have a bearing on the health. If the rooms are well lighted by windows in front and back, or on opposed sides, so constructed as to be readily opened, and which are not very remotely apart, this will be favourable. "Well-openings" of various kinds, now common where the area of the floors is great, assist in giving light, but do little for ventilation in comparison with properly-placed windows. Unfortunately, in a number of structures that have been built for warehouses (of transmuted dwelling-houses I am not now speaking) there are windows on one side only, the opposed side being a dead wall, and proper ventilation, therefore, out of the question; to say nothing of the impossibility of so placing the *latrines* as to avoid atmospheric pollution. An instance will best explain what I mean. A gentleman in delicate health, on whom I was attending, said to me—"I fear the air in my office is not good: I wish you would look in, and tell me if it could be improved." On calling, I found a warehouse for grey goods, employing about forty hands. It was an extensive structure of four stories, back to back with another warehouse, the windows in one end and side. On entering the ground story, I was sensible of an unpleasant odour, and at the same moment I cast my eye on two doors facing me, near the before-mentioned dead wall. On asking a man what were these, he said they were the closets, one for the masters and the other for the hands. It being early in the forenoon, and the closets, of course, recently used, the atmosphere was a good deal tainted; and as such air will ascend and circulate through a building, I found, on reaching the offices, which were on the first story, that they were not free from taint: this, I may remark, is anything but a solitary case. In some warehouses I found there was no watercloset, the hands having to get accommodated as they best could. In a number of recently-built ones, however, is an outside stair behind, and off the landing for each flat of this stair is a little room containing a watercloset, urinal, and lavatory. Yet even here the latrine might be better ventilated than in any instances I have yet seen. On points such as these architects have something still to learn. As connected with salubrity, it would be wrong to omit the mention of an atmosphere loaded with dust and fine filamentous particles in certain quarters of shipping warehouses, produced in preparing the goods for packing. I know not how the evil is to be remedied; but I am assured that it gives rise to cough and ill health in those—often lads—who from morning till night are inhaling it.†

The lighting of warehouses by gas is doubtless an improvement upon lamps and candles, giving a brighter and clearer light, and lessening the risk of accidents by fire. But gas used, as it commonly is, without a flue to bear away the heated impure air—the product of its combustion—is unwholesome, partly from the large quantity of oxygen it consumes, leaving the atmosphere *poor*, and partly from the flood of carbonic acid it generates. This is especially noticeable in the offices where sit the masters and clerks; and so depressing to the feelings have I known this impoverished air to become, that the gaslight has had to give place to the feebler illumination of the oil-lamp. What is the remedy? I answer, a flue in every instance, opening over the flame, to carry off the heated and vitiated air as it is being produced. I cordially agree with what the editor of the *Builder* says on this point,—"A gaslight without a chimney, or ventilating apparatus, ought to be as unusual as a fire without a flue."* In thus alluding to warehouse offices, I may just observe that, in many instances, to my knowledge, the air in them is sickly and depressing to the spirits, owing solely to imperfect ventilation. Such an office ought to have either a dwarfed partition, to give it community of atmosphere with the rest of the warehouse, or, the partition going to the ceiling, it ought to have windows in the partition opposite those by which it is lighted from without, in order that, when necessary, the air may be speedily renewed by a through current. Rarely do I enter an office of any kind without being at once sensible that I am breathing an impoverished atmosphere; and as the remedy is easy, it ought not to be neglected.†

It will not be denied that mechanical inventions, employed as substitutes for, as well as in aid of man's muscular powers, are beneficial; and nowhere is this more strikingly apparent than in a number of our large warehouses. Formerly (even now, in some instances), tons of goods were bought and laid at the warehouse door, thence to be borne, perhaps to the fourth or fifth story, on the backs of porters; reminding one of the astonishing feats of strength and endurance, told by Humboldt, of the Indians in the Peruvian mines, who not only climb ladders from a great depth, like the Cornish men, but bear the produce of their labour to the surface on their backs. I cannot better illustrate the value of mechanical helps than by referring to a petition of the cotton-yarn porters of Glasgow, addressed to the cotton spinners of England and Scotland, praying them to send lighter burdens. They say, that from the nature of their employment, the manner in which warehouses are constructed in that city, and from the absence of hoists in them, they (the petitioners) are compelled to carry skips to third and even fourth flats, whereby they have sustained serious bodily injury; further, that as *all* of them are not able to carry the heavy weights which are sent into the market, the few who are strong and young have to do the share of the less powerful and aged of their number, and thus, ere long, are reduced in strength, and become diseased by such excess of labour.‡ We may hope the petition will not be in vain; for, when we notice how rapidly goods in warehouses are packed by the hydraulic press worked by steam power, how easily the heaviest bale, laid on a truck and wheeled to the hoist, is, by this means, carried from any flat to the basement, where, on another truck, it is pushed to the loading door, and with tackle, managed by the hand of a mere lad, is lifted into the waggon, it is obvious that science renders now the infliction of bodily injury by heavy burdens laid on porters without excuse.

Leaving what has been said concerning the Nottingham warehouse to produce its effect on humane and benevolent minds—it will not be read without some benefit—I proceed, in conclusion, to say a word or two on the late hours and the night-work in a number of our warehouses. I have reason to believe that late and night labour is losing favour with a few of the more enlightened employers, because it is not found to be, upon the whole, profitable. Even this is encouraging. We must not repine should the majority go on for a

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* This transmutation of dwelling-houses into warehouses in Manchester, is a subject of considerable local interest and curiosity. The following account of it, with the rise and extension of the different branches of our trade, I have from Mr. David Bellhouse, than whom, from his great local knowledge, no one is more competent to supply this kind of information:—"The first warehouses I remember being built," says he, "were in what were then called the 'New Market-buildings,' off Cross-street, near to Market-street. What was known as 'New Market' had been built by the Lord of the Manor, and had a butchers' shambles and fish market; but in course of time these were done away, and the land became the site of warehouses. They were all cotton warehouses. At this time (1804) the cotton trade, dealing in the raw material, was a principal trade in Manchester; and the cotton warehouses congregated round, and as near as might be, the Exchange, including Back-square, Bank-street, Half Moon-street, Cross-street, New Market-buildings, and some on the other side of Market-street, as Cromford-court, New Cannon-street, &c. By degrees the cotton trade declined, just as spinning and manufacturing increased,—the cotton being either imported by the spinners themselves, or bought, as it is now, through the brokers in Liverpool. From about 1804 onwards, the principal warehouses for manufacturers and the country trade were in Hodgson-square and an extensive lot of narrow streets, including the Blue Boar-court district through the heart of which Corporation-street now runs), Cannon-street, New Cannon-street, Duke-street, Peel-street, High-street, Marsden-square, Church-street, and adjacent small streets. These warehouses were originally, for the most part, dwelling-houses altered and enlarged. I remember dwelling-houses in Cannon-street, and in High-street, at the end nearest Market-street, where also was the Bridgewater Arms, then the principal hotel, the site of which is now covered with warehouses. By degrees these warehouses, altered from houses, became inadequate to the requirements of the extending trade of Manchester. A few new ones were built at the bottom of Cannon-street, one—I believe, the first—by the late Messrs. Richard and Thomas Potter; then a new pile, called Cleveland's-buildings, Tipping's-court; next, some new ones in High-street, Church-street, Marsden-square, and top of Cannon-street; and, more recently, in New Brown-street, Palace-street, and Spring-gardens. I think this brings us down to 1825 or 1830, from which period the 'country-trade warehouse' increased in importance, and even the comparatively recent warehouses became inadequate. The Cannon-street district was completely deserted by the home trade, and the old warehouses fell in value and were used for inferior trades, such as those of the country manufacturers, &c. The country trade, however, began to spread into Fountain-street, where Watts' had their first large warehouse,—Church-street, where Phillips's house settled, and is there now,—then to Mosley-street, York-street, George-street, Booth-street, Parker-street, Piccadilly, and Portland-street, ending in such handsome establishments as Potters and Norris's, McLaren's, Bannerman's, Westhead's, Kershaw & Co.'s, Brown & Co.'s, Sam Fletcher & Co.'s, Jackson's, and Messrs. Watts's. During this time another branch has been rapidly increasing—the shipping trade; and for this great numbers of new warehouses—some of them magnificent—have been built in streets generally distant from the Exchange; but on a matter so well known, it is, of course, needless for me to enlarge."

* I am informed by an experienced upper servant in one of our warehouses, who used to be in a London house, that *there* a considerable proportion of the hands remain and sleep on the premises, the beds often laid in corridors and other close quarters.

† Perhaps flues running to the roof from each flat or room where this dusty work goes on, and a current maintained up each flue by a ventilating wheel at the top, might be found useful.

* See the *Builder* for November 26, 1859, p. 770.

† The close, unwholesome state of offices, law-courts, schools, and places of public worship, is not peculiar to this country. In New York, we are told that the court-rooms are proverbially unhealthy, and valuable lives have been sacrificed in consequence of the bad air which prevails in them during the transaction of public business. The offices attached are equally liable to objection, and even the churches, during a crowded service, in many instances, are almost insufferable from the heat and impurity of the internal air. School-houses, also, by the neglect of sanitary science, endanger or permanently injure the health of both teachers and pupils. See the elaborate and most interesting report of a select committee appointed to investigate the Health Department of the city of New York, presented to the Legislature February 3rd, 1859, p. 19.

‡ This curious petition, which is well worth reading, may be seen in the *Manchester Guardian* for October 31, 1859.

while in the old way; for progress, though slow, is sure: long experience has taught me this, and leads me to anticipate that, in time, the interest of the employer will be seen in all cases to harmonize with justice and mercy to the labourer. Forty years ago I remember well the absurd way in which factory labour went on, when even children of six years worked, under the stimulus of the strap, sixteen hours a day; and, through a long subsequent period, how a set of night-hands kept the factory illuminated till morning, and that with the most deplorable consequences to the morals of these workers. All this is happily of the past; for factory labour, thanks to wise legislation, is now as compatible with health and morals as any kind of employment. Another step in the right direction was the Saturday half-holiday, which, however, as many will remember, encountered strenuous opposition, notwithstanding it could not be denied that late Saturday labour usually led to a violation at once of the laws of religion and humanity. A friend told me, during the agitation for this reform, that curiosity induced him to go to an extensive bleacher, whose works lie about twelve miles from Manchester, and ask at what hour on Saturday his carters got home. Pondering the question for a little, the bleacher replied,—"Saturday! No, they usually get home about six on Sunday morning." "And what then," said my friend, "do the men do with themselves when they have unyoked and put up?" "Oh," said he, "they are asleep immediately in the straw beside the horses." All this sounds to us now as something fabulous.

The *policy* of night-work has always, I confess, appeared to me questionable, and it does so more especially now, when mechanical means enable the packing and loading of goods to be accomplished with such wonderful ease and rapidity. If it be contended that shipping orders have often to be executed with a promptitude which necessitates late, and even night labour, the reply is, that this kind of argument *of urgent necessity* may be advanced against almost every reform, just as happened with respect to the Saturday afternoon holiday (admitted now to be an unalloyed good).*

It is pleasant to be able to report that some of the gross evils connected with late and night-work are being gradually, though perhaps slowly, mitigated. I allude in particular to the substitution now, by some, of tea and coffee for the refreshment of the late and night hands, instead of the old allowance of beer. The extent of beer consumption in late-working warehouses may be imagined when I state that as much as 5*l.* a week has been paid for the beer consumed by the hands in a single house; and I have been told of a more lavish rate of expenditure in some houses than even this. As a medical man, I can say, from personal knowledge, that amongst the clerks and younger hands, the late-hour system—that is, leaving off at ten, eleven, or twelve o'clock—exposes to temptation and immorality. With regard to the masters, especially the younger members of the firm, who usually stay the last, and upper servants, ambitious of making for themselves "a position," I fear the habit of late work, though sometimes disavowed, prevails in busy seasons almost as much as formerly; and that, in the case of not a few, the consequent exhaustion of body and mind (to say nothing of the unseasonable hours and the waiting up they inflict on their households) more than counterbalances the advantage supposed to be gained. Indeed, this too eager pursuit of business,—this lavish waste of health and vigour on the part of very many who have come under my notice,—has often reminded me of what is suggested in the homely adage about burning the candle at both ends; for if we will thus make light of Nature's best gift—"a sound mind in a sound body"—we need not be surprised should she vindicate her beneficent laws by a painful award.

* It is instructive to read what Mr. Russell, in his "North America, its Agriculture and Climate," page 226, reports of late and night working in the island of Cuba during the six months of the cane-crushing season. The negroes begin the day's work at half-past four, and at ten have an hour for breakfast; then resuming the work go on till sunset, when they have an hour for dinner; after which they toil till midnight; thus working eighteen hours out of the twenty-four. He was assured by an engineer that fatal accidents, from the labourers being overcome with sleep and falling into the boiling pans, are not uncommon. Happily we have nothing quite so bad as this amongst us. One of our houses, to my knowledge, is setting an example to its neighbours which it would be well were they to follow: the packers give over at nine, come in the morning at six, and at eight o'clock have a substantial breakfast provided at their employers' expense.

BRITISH ARCHÆOLOGICAL ASSOCIATION IN SHROPSHIRE.*

The alternating of wet and fine days gave us our share of rain on Wednesday, the 8th; and although the arrangements comprised the examination of works of great interest, there was a sensible falling off in the number of the excursionists, although there were more than sufficient to cover the guarantee of a minimum for the special trains engaged. On arriving at Shiffnal the rain fell in torrents, and some members returned. The programme was involuntarily altered; and, after hastily viewing the church, the Rev. Mr. Petit's paper being postponed, the company, in sections, made their first resting-point at Tong Castle, where Mr. Tucker received the Association (in the name of Captain Thorneycroft, who was absent at a distance), and read a paper chiefly on the lords of the castle (of which he said there had been four). The present building is modern. Thence to Tong Church was a short drive across the park. Mr. R. Horman Fisher read a paper on the subject. He described it as a cross church, although this had been questioned, and that it was almost unique in the general arrangement. The outside is much plainer than the inside.

At the north-east corner he considered there had been a chapel to the Virgin: he came to this conclusion from a statue there. The south aisle was older than any other part. The Rev. J. L. Petit explained his discovery of the earlier and more elaborate label moulding to the south face of the arcade, between the nave and south aisle; but Mr. C. E. Davis thought it not earlier, but a specimen of the more elaborate finish given to the faces of internal walls, where a strong light fell. Both Mr. Gordon Hills and Mr. Roberts thought it was of a different date to the other part of the church, but partly reworked. Mr. Planché gave his opinion on the monumental effigies of the Pembrugge family. He said it was the first time he had seen them. There were some points of interest about them: the date of one was 1408, and would apply to Sir Fowke Pembrugge: it had the same bassinet and hauberk as in Henry IV.'s time, and the same kind of jupon which preceded the complete plate. The effigy of the lady gave him the impression at first that it was of Sir Fowke's first wife, of the family of Trussell. It is habited as a widow, with the barbe crossed above the chin. The costume was of the date of 1446, and therefore was not that of his first wife. He thought it must be of his second wife, who survived him. He differed, with great diffidence, from so great an authority as the Rev. Mr. Eyton. The other tomb was that of one of the Vernons. Some of the shields in these monuments were blank, probably left to be filled up afterwards.

The president had arranged to receive the Association at Decker-hill, where accordingly the company arrived, and found that an unfortunate misunderstanding had caused the president to keep to the programme, which the violent weather had induced the members to alter. The reception was not the less cordial for this *contretemps*, and almost immediately an elegant *déjeûner* was laid in two reception-rooms, presided over respectively by Mr. Botfield and his lady, to whom thanks were most sincerely returned; and then a division of the members occurred, part returning to Shrewsbury *viâ* Shiffnal, and about thirty enlisting the services of Mr. Roberts (who had made a preliminary examination) in an inspection of Lilleshall Abbey. The weather cleared in the course of the drive, and it formed a delightful excursion.

The foundation of this building is of the time of Stephen, by Ethelfleda, a daughter of King Alfred, who was subsequently a perfect amazon, and was called the "Lady of the Mercians." There must have been a large guest-hall and extensive dormitories; for, being on the high road, the number of demands by travellers was very great; and the abbots made several complaints of their want of means to supply these demands. It was an abbey of regular canons of St. Augustine. There were several charters by which privileges were granted by Stephen, Henry Duke of Normandy, King John, Henry III., Edward I., Richard II., and even Henry VIII. Amongst the benefactors were Fitzalan, part of whose monumental slab the association had discovered at Buildwas on Tuesday; Le Strange, Dunstanville, Pantolfe, Lezouche, Trusbutt, and Erdington.

The buildings consist of a nave, choir, and transept, with, perhaps, a lady chapel; the nave being Early English, the other being Norman. The west doorway displays exquisite Early English mouldings, with fillets adapted to the circula arch, such as are found in many of the Shropshir transitional works. The great west window ha been inserted, and is Late First Pointed. The south aisle of the chancel, or lady chapel, is in effect a separate chapel built against the main building, with a very perfect piscina and credence in one, with a shelf or ambry over one corner of it. The drain from the piscina is horizontal. The north aisle is a separate chapel or chantry, with an ambry remaining. In the choir is a semicircular arch over a recess with Early English mouldings and shafts. The stalls were removed from here to Wolverhampton at the dissolution, and are believed to be in existence now. All these buildings were vaulted. On examining the exterior, Mr. Roberts pointed out the early specimens of buttresses.

The conventual buildings were next examined: they are, unfortunately, desecrated by being converted into stables—the cloister into a pheasantry, and the refectories into refuse yards.

The chapter-house is in the same position as at Wenlock, with a sacristy or treasury on one side, and a scriptorium on the other. The refectory on the south side of the cloister has a very peculiar and beautiful recess; used, probably, as the pulpit, with a quatrefoil in plate to give light, and was most likely inserted afterwards, as the character is later. In two recesses are laid fragments of tombs, one being a knight of the date of King John or Henry III., judging from the armour and shield; and the other of an abbot, apparently, of the earliest Decorated period. In the chapter-house are two coffin-lids, one without any mark or inscription remaining, and the other with a cross calvary, the cross being within a wheel.

At the evening meeting, the Rev. C. H. Hartshorne read an interesting paper on "Powis Land and Powis Castle." That which we referred to last week, read by Mr. Hartshorne, was one on "The Princes of Upper Powis," by the Hon. and Rev. George Bridgeman, — our reporter was accidentally seated in a part of the court where he was precluded from hearing well, and the court is one of the worst possible in respect of hearing. The other papers were by the Rev. George Dod on "Boscobel," and Mr. E. Levien on "The Shrewsbury Book."

This book is so called because it was executed by order of John Talbot, Esq., of Shrewsbury, as a wedding present for Margaret, daughter of Renè, duke of Anjou and Maine, and titular king of Sicily, Naples, and Jerusalem, upon the occasion of her marriage with Henry VI., king of England and France, in April 1445. The volume is interesting as an example of the state of arts at the period when it was executed, and on account of the historical associations which it calls up, and the illustrious persons by and to whom it was presented. Margaret of Anjou was an artist of no ordinary degree of merit.

Thursday, August the 9th, was a railway day, but still an early departure was made; and the weather being more propitious, a large party assembled, and, a special train being prepared, no time was wasted. The first stoppage was at Stokesay Castle, of which Mr. C. E. Davis gave a description. The account given by Mr. Parker, he said, was incorrect. He stated that the license to crenellate Stokesay, obtained by Lawrence de Ludlowe, in 1291, could be but little guide in ascertaining the date of the present castle, as it was quite clear that it must have existed previously, as two portions (the two towers) were of earlier date. The southern tower resembles very much the Peel towers of the Borders, and is, doubtless, a complete fortress. The lower story was entered by a large doorway, and all the other stories were approached by a staircase within the thickness of the walls. The story above has an entrance which was approached by a small bridge. These two were, doubtless, ordinarily used; but in case of defence being necessary, Mr. Davis had no doubt that the lower door would be walled up, and the upper one only used. On the story above, singularly enough, one of the windows was inserted in an archway; that is, it had the remains of door-hinges, proving most certainly that this must have been an entrance also that might be used, closing both lower doors, and making this tower resemble in all particulars the Border castles. The great hall is clearly the erection of Lawrence de Ludlowe, and is a fine specimen of the architecture of the period.

The party afterwards proceeded to the side of the railway line, and were taken up by a train, and continued their trip to Ludlow, the church of which was described by Mr. Edward Roberts. He said it was a curious specimen of the utter obliteration of the former work by a casing of the walls in a later period. He pointed out several early

* See p. 507, *ante*.

parts which still were visible, particularly two piscinæ in the large south chapel, one of them being semicircular, although, as at Lilleshall, with Early English mouldings, and with a horizontal drain. The Rev. Mr. Hartshorne thought them even so late as Decorated. The glass and rood screens were pointed to as very beautiful.

The castle was examined and described by Mr. Thomas Wright. He said the earliest account was in the history of the Fitzwarines, which is curious and partly traditional. It was stated to have been built by Roger de Montgomery, Mr. Eyton, however, showed that from an examination of all the documents, that could not have been; and one very good reason was, that the land itself never belonged to him. It was probably built by the Lacies, between whom and the Fitzwarines there was a deadly feud, and might account for both families possessing it in the course of warfare. It was founded before the end of the twelfth century; and, by the middle of the thirteenth century, the whole castle covered as much ground as now. It was occupied by the two princes who were murdered. Edward IV. had rebuilt the residence in it, and several times the court was held there. The greatest alterations were made in Elizabeth's reign. The furniture remained in it as late as the middle of the eighteenth century.

After a minute account of the several apartments, the party assembled at the antiquated "Feathers' Inn, a pretty half-timbered house, and accepted a very handsome luncheon at the hands of Sir Charles Rouse Boughton, to whom thanks were given. Some healths were drunk, including Mr. Thomas Wright, proposed by Mr. Mair, of Liverpool, and "The Ladies," proposed by Mr. Pettigrew, in a speech full of humour and spirit.

There was still an hour to spare: this some filled up by visiting Ludford Church, which Mr. E. Roberts described as peculiar in respect of being a very small nave and chancel, with a very large chapel. The west wall is evidently older then the other part, and might be either Saxon or Norman. The tower has been built against it. There are several Mediæval tombs.

At the evening meeting, the Rev. J. L. Petit read a paper on Shiffnal Church, an elaborate memoir profusely illustrated.

This was followed by Mr. Thomas Wright's paper on the Legends of Shropshire, from which we must give a couple of examples:—

"Everybody will remember the story of the building of Carthage, how the founders could only obtain as much land as they could encircle in a bull's hide, and how they craftily cut it into slender thongs, and thus contrived to encircle as much land as was sufficient to build a town. Geoffrey of Monmouth tells the same story of Hengist, who, by the same stratagem, obtained from the Britons land enough to build a castle, to which, in memory of the transaction, the Saxons gave the name of Thancaster. There are several places in England to which this legend is attached, and among them that of Tong in Shropshire. This same story has taken a very curious form in a legend preserved in the parish of Bromfield, in our county, where they tell of a young lady, whose father would not permit her to marry a gallant knight because the latter was only a younger brother and unable to offer her a sufficient marriage settlement. The young lady, however, persisted in her resolution to marry the knight, and at last one day she informed her father that the ceremony was to be performed the next morning at Bromfield Church. The angry parent told his daughter she might follow her will, but, of all his great estates she should receive for her portion no more land than she could crawl over before morning. She went from his sight, apparently unaffected by this threat, but next day she made her appearance at the breakfast-table covered with mud, and announced that she had secured a tract of meadow reaching about half-way to Downton, round which she had crawled on her hands and knees during the long winter night. The father was so pleased with the spirit displayed by his daughter that he made her the heiress of all his estates, and they remained in the possession of her descendants many years. This ground is still called Crawl Meadows."

"There is another legend connected with Shrewsbury, intended to explain the cause of the extension of the trade in Welsh flannel, and it is certainly a curious illustration of the history of the more miscellaneous class of local legends. It is said that the Welshmen took the precaution of measuring their 'pieces' of flannel before they left their homes, but the purchasers in the Shrewsbury market, who bought by the yard, invented a method of measuring which pleased by its quickness and ingenuity, under cover of which was practised a rather ridiculous deception. They made a round barrel or frame, exactly one yard in circumference, on which the parties concerned placed one end of the piece, and went on rolling it until the whole piece was wound up, each revolution counting for a yard. For very obvious reasons, the Welsh seller always found his piece shorter at Shrewsbury than at home, until, having at last discovered the trick, the Welshman refused to attend the Shrewsbury market any longer."

We must finish our notice next week.

A LIMP ACCOUNT OF THE SUSSEX ARCHÆOLOGICAL DAMP DAY AT PEVENSEY.

The Sussex Archæological Society held its annual meeting on Wednesday in last week, Pevensey and Hurstmonceux Castles being the points of interest purposed to be visited. A previous attempt, ten years ago, to inspect Pevensey Castle, had been rendered abortive by the very bad weather; and now again the old spell seemed to rest upon the excursion, for the rain descended in a hopeless never-to-be-ended manner. A special train was arranged to start from Brighton at ten o'clock, and it was with an ominous smile of half contemptuous pity that the smart young ticket-collector pointed it out to the adventurous archæologists, as he inquired, "Pevensey, Sir?" The said "special train" was specially late in starting; but doubtless the officials purposely detained it, with the charitable design of keeping its passengers as long as possible under cover, reasonably concluding they would find *such* a day long enough any how. Some of the carriages were unprovided with lamps, the directors doubtless thinking these illustrious *illuminati*, who can look into the past through the darkness of ages, and make all things clear by the light of their own minds, could not possibly need lamps to guide them through the gloom of merely a tunnel or two. Considering the very settled state of the weather—settled for rain, that is—the society must be congratulated on the enterprising spirit of its members, as evinced by the respectably large gathering of them which congregated within the roofless walls of the picturesque ruins, Pevensey and Hurstmonceux. But the proposition to alight, and view the church close to Pevensey Castle, was, nevertheless, negatived in some of the conveyances, by the majority of the party; so the minority had to content itself with a passing glimpse of the strangely extensive old pile, and to console itself with the assurance that, thanks to railroads, one could easily run over any fine day and inspect the church, which, from the antiquity of its walls, promised many points of interest, in spite of the fearful "Carpenter's Gothic" of its windows.

Another hour of close compression, in tightly packed vehicles, brought the members to the top of the hill, at the foot of which Hurstmonceux stands. Here all who would view the noble ruin were compelled to alight, it being judged, but erroneously so, by the respective Jehus, quite impossible for the carriages to reascend the once-descended slope. Accordingly, ladies and gentlemen turned out in the pouring rain, raging wind, and driving mist, to walk down over steaming grass that covered their feet nearly to the ankles; but the universal good temper that prevailed diminished all difficulties, and the desire to make the best of a bad business was everywhere apparent. One little lady, in our hearing, exclaimed, good humouredly, on being condoled with, "If the day had been fine, where would have been the use of putting on our prettiest petticoats, for we should have had no opportunity for displaying them?"

Umbrellas were all but useless: many of them were turned inside out, and portions of others blown bodily away; while those that maintained their integrity of shape were altogether unable to afford protection from the pitiless, all-permeating, misty deluge. Nevertheless, one or two enthusiasts, on whose vision the beauty of the pile opened for the first time, actually stood still for some minutes, regardless of discomfort to body, to feast their minds on the grand effect it produced, which effect was doubtless doubled in grandeur by the scaur of the storm.

Within the ruin printed descriptions of it were distributed to the visitors, this method of imparting information being thought preferable to the old plan of "reading papers," it having been noticed, on some former occasions, that as the lecture proceeded the ladies gradually melted away from the throng by twos and threes, and, as was of course to be expected, their respective escorts of gentlemen presently followed them, leaving, at last, the worthy lecturer himself, and a few of the committee-men, alone with the learning.*

Here you have what was said about the building:—

This building was erected in the year 1440, by Sir Roger de Fynes, at a cost of 3,800*l*. A manor-house had previously occupied the site, and been the seat, successively, of the De Hersts, the De Monceux, and the Fyneses, from the time of the Conquest. To the park which had previously existed, Sir Roger added 600 acres of land. His son, Richard Fynes, Sheriff of Surrey and Sussex in 1452, married Joan, heiress of Thomas Lord Dacre, and was, in her right, summoned to Parliament, and declared Baron Dacre of the South in 1458. Thomas, the second Lord Dacre, distinguished himself as a soldier, and was Constable of Calais. He died in 1534, and was buried under a magnificent altar tomb in Hurstmonceux Church. His grandson and successor, Thomas Lord Dacre, associates this place with a very tragical event. Engaging in the foolish and unlawful frolic of hunting deer in the park of his neighbour, Sir Nicholas Pelham at Hellingly, a fray took place between his companions and the knight's gamekeepers, which resulted in the death of one of the latter. For this Lord Dacre was held responsible, and he, together with three of his gentlemen, Mantel, Frowds, and Roidon, were executed at St. Thomas Waterings, 29th June, 1541. This event has been dramatized by Mrs. Gore, in her "Dacre of the South;" and it is the subject of a ballad in Mr. Lower's "Contribution to Literature." Gregory, son of this unfortunate baron, succeeded to the title, but died unmarried. His sister Margaret espoused Samson Lennard, Esq., and was recognized as Baroness Dacre. They resided much at the castle, and added greatly to its internal decorations. The castle and estate remained in the Lennard family until the time of Thomas Lord Dacre, created Earl of Sussex by Charles II. He improved the castle by the addition of sash windows on the east; but, losing a great part of his estate by extravagance and gambling, was obliged to sell Hurstmonceux, the seat of his ancestors from the Conquest. In 1708 the estate became the property of George Naylor, Esq., of Lincoln's-inn, who married a sister of Thomas Pelham, Duke of Newcastle. His successor was his kinsman, Dr. Francis Hare, Bishop of Chichester, and the latter left the castle to his son, Francis Naylor. In 1775 it devolved upon his half-brother, the Rev. Robert Hare, but was then considered to be so dilapidated as to be past repair. The interior was therefore demolished, and the materials were employed in adding to the mansion called Hurstmonceux Place. From F. Hare Naylor, Esq., in 1807, the estate passed by sale to Thomas Read Kemp, Esq. In 1819, it was purchased by the Gillon family. In 1846, Jno. Gillon, Esq., M.P., sold it to H. B. Curteis, Esq., M.P., father of Herbert Mascall Curteis, Esq., the present owner. The castle is accounted one of the earliest brick buildings in England. It is also among the latest specimens of a castle, properly so called; possessing much of the grandeur, with little of the strength, of the feudal fortress of earlier times. When in full repair, it was considered the largest house in England belonging to a subject. Addison's comedy, "The Drummer, or, the Haunted House," is said to be based upon a tradition connected with this mansion. The room immediately over the Porter's Lodge was known as Drummer's Hall, from the loud "spirit-rapping" formerly carried on there.

After a hurried inspection there came the repacking of damp individuals into very small omnibuses and other conveyances, and then the return to Pevensey. During the retreat animal spirits were decidedly "below proof," doubtless reduced in strength by the involuntary admixture of water from the clouds; and possibly also by the unwonted fasting which, in many instances, extended from eight o'clock in the morning till between two and three in the afternoon. Re-arrived at Pevensey, however, a handsome spacious booth (which the Society is ambitious of purchasing), erected within the ruins, gladdened the eyes of the intrepid voyagers,—I use the word advisedly, this being decidedly a *watery* excursion,—and a capital dinner, well cooked, well served, and well eaten, brought to a more successful termination than could have been anticipated, a day which had opened upon the Sussex Archæologists with so little promise, and which had hitherto certainly not belied its foreshadowing.

The Lord Bishop of Chichester presided at the dinner; and, after its conclusion, appropriate toasts were given; but, though the circumstance was once just barely mentioned, all the speakers missed taking advantage of what might have been made a fine point in a speech,—the grand effect produced by the heavy measured booming of the murderous gun, which, as a trial of its own power, was endeavouring to batter down one of the massive Martello towers hard by;—so named, as the *Builder* has before now said, from Mortello, or Myrtle bay, in Corsica, whence they were copied, and which were raised on our coast as a protection against the expected invasion of the Corsican, Napoleon Bonaparte.

Mr. Mark Anthony Lower read a versified descriptive account of Pevensey, respecting which I will only say, it was a pity the author had not contented himself with the rich smooth plain of grandly-marching prose, instead of attempting to toil up the steeps of Parnassus, only to lose himself in the mist and fog which on Wednesday last enveloped all heights, physical and fanciful.

Subsequently Mr. W. Durrant Cooper read a very curious letter, hitherto unpublished, from

* Some notices of Pevensey and Hurstmonceux will be found in previous volumes of the *Builder*, especially the volume for 1855, p. 433.

Dr. Andrew Borde,—the original "Merry Andrew."

One idea worth recording was eliminated during the return journey home, to the effect, that archæological meetings might be rendered additionally interesting and instructive, if arranged chonologically as to periods,—the British, Roman, Danish, Saxon, Norman, &c. And it was suggested that a local museum, illustrating solely the precise period of the building to be investigated, should be collected; and that all papers read, and all decorations used, should be made to bear upon the same point.

A WOULD-BE ARCHÆOLOGIST.

WHITBY.*

WHITBY occupies a very picturesque position at the mouth of the Esk, on the Yorkshire coast, midway between the Humber and the Tyne. The vicinity is fine, with all the dales and glens connected with the Esk. The town is built on the two opposite sides of the inlet formed by the river in its passage to the sea; and the harbour, above the revolving bridge by which the divisions are connected, is capable of containing 300 vessels of the medium size; the two lighthouse piers shaping the entrance, as well as guiding to the port. The landmarks are, the abbey in ruins, and the old parish church, on the eastern cliff; while, on the summit of the western eminence, the terraces extend in lines of modern construction. The town, with its 11,000 inhabitants, crowds in its central parts towards the water. The alleys or yards stretch from the top to the bottom of the acclivities, and the houses on either side, built tier above tier, are reached by flights of stone stairs; the higher landing-places, above the sphere of roofs, and masts, and smoking chimneys, having their own view of the town, the harbour, and the German Ocean.

"Whitby, and not Scarborough," says White, in his "Month in Yorkshire," "would be my choice had I to sojourn for a few weeks on the Yorkshire coast. What it lacks in the style and show, which characterize its aristocratic neighbour, is more than made up by its situation on a river, and the beauty of its neighbourhood."

The vicinity has its antiquarian and its poetical interest, too. Here the famous St. Hilda dwelt in her abbey of Streonshalh, which she founded in the seventh century. Ages have gone by since Hilda was gathered to her fathers, but posterity still cherishes her memory. A fair is held to this day at Whitby on her birth-day, the 16th of August. The town owns her for its patron saint. Churches are dedicated to her, and miracles ascribed; for in the "olden tyme" the neighbourhood was cleared of its *snakes* by her power, as the abundance of its Ammonites testifies!

> "Then sole amid the serpent tribe,
> The holy abbess stood,
> With fervent faith and uplift hands
> Grasping the holy rood.
>
> The suppliant's prayer and powerful charm
> Th' unnumber'd reptiles own:
> Each falling from the cliff becomes
> A headless coil of stone."

Hilda was succeeded as abbess of Streonshalh by Elfleda, the friend of St. Cuthbert of Lindisfarne, of both of whom, and their friendship, Bede discourses at large.

The town of Streonshalh and its monastic core were destroyed in 867 by the Danes, and both lay desolate for 200 years. The monastic foundation, however, was re-established in 1074, by Reinfrid, a zealous monk of Evesham, to whom William de Percy granted the conventual ruins; but there are no grounds for believing in the rebuilding of the monastery by its first Norman possessors. However, of this it is certain, that all traces, both Saxon and Norman, have disappeared in the erection of the present fabric, which exhibits the Pointed Gothic in its first, second, and third periods or styles, the first, or oldest, belonging to a date a century later than the lifetime of Reinfrid. The town of Whitby, like its predecessor, Streonshalh, arose as a dependency on the abbey.

The abbey church has been the most stately fabric in the monastic group. The east end, with the walls of the choir and the north aisle; the north transept, and a remnant of the nave, still remain; but the dwellings and offices for the household, as standing on the south and south-west of the church, having all been removed, are known only by name in the records. The abbey is the great historical monument of the district. When entire, the square tower, as marking the centre of the cruciformation, arose on four huge arches opening to the usual quarters of a church—the choir on the east, the transepts north and south, and the nave, or longest part, on the west. On the site of Hilda's foundation the fabric in length is 310 feet; and, with the south projection of the transept, which is gone, the cross extent would be 153 feet. The main side walls in height are 60 feet. The height of the tower was 104 feet.

In the earlier eras, the monastic buildings in their character were primitive and unpretending; but an advance in magnificence marks their erection as ecclesiastical splendour grew with an increase of revenue. The choir, in the lancet or Early English style, is ascribed to the abbot Richard of Peterborough, whose administration lay between 1148 and 1175. The eastern front, entire, exhibits six lancet windows in two tiers, with three of smaller dimensions in the gable between the pinnacles, for lighting the roof. Sided by seven pier arches for the ground story, the superaltitudes are the triforium and the clerestory. Within the walls, a passage crossing the lancet lights of the clerestory has communicated with the different quarters of the building, one approach remaining at the west angle of the north transept, and another at the north-west angle of the nave. At the distance of one arch from the east end of the choir the pillars indicate a screen for the high altar.

The south aisle of the choir is gone. The extant north aisle retains a part of its groined roof, with carved bosses at the intersections of the ribs. On one is a lion rampant: another bears the lamb and flag, an emblem of peace: a third has two fishes; and a fourth is a circlet of foliage or flowers. The windows throughout are "single lancets," charged with dental and zigzag mouldings, the arches of those in the clerestory springing from heads crowned and mailed. The body of the choir would be roofed with wood: the side aisles were vaulted in stone. The front of the north transept, still perfect, presents nine lancet windows in three tiers, with a small "Catherine wheel" in the gable. The style is Decorated.

Viewed from within, the windows recede in elaborate undercut borderings, and the capitals of the side shafts, in contrast with the plain round caps of the choir, are an exuberance of foliage and flowers, in which birds and fruit appear and reptile formations entwine.

The tower fell on a calm day, June 25th, 1830. The pillar at the south-west corner had long been cracked; and, as a further weakness, the staircase within it is recollected as approached from the south transept. The top story was panelled on the four sides in window-shaped compartments, three on each side, and a staff with a vane stood at the north-west angle.

The nave has formed a perspective of eight arches, being one arch longer in the parallel than the choir. All that remains of it is part of the north side aisle and a fragment of the west end, in which we perceive the principal entrance to the church, the access in ordinary being by a small doorway, formerly porched, and still extant in the side wall aforesaid.

The west end, by pre-eminence "the front," has been very imposing. In the central space, between pinnacled buttresses, the principal entrance shafted and moulded, and "the great light of the nave" with its variform tracery, stood deeply embayed. The front, in its leading details, belongs to the last variation in Gothic architecture—the Perpendicular style; the indications being found in the window constructions.

The nave is not in a straight line with the choir, but exhibits a deflection at the west end of 9 feet towards the north. The cause is a query, and the solution hitherto given not satisfactory enough to be interesting.

The parish church was originally founded after the Conquest, for the use of the laity. In 1540 it became parochial. Originally Norman in nave and chancel, with the entrance on the south side of the former, the tower at the west end, as well as the transepts, are after additions. The entrance, round-arched, with a pair of "cushion-capped" columns on either hand, was destroyed in 1823, to make the principal porch nearer the tower, where it now is. A line of semicircular-headed windows, each 4 feet high and 22 inches broad, originally encircled the building; and, as an outside example, the one blocked up over the modern porch aforesaid may be cited.

In the modernization of the old fabric, a process which commenced in 1744, the walls were everywhere pierced for the ordinary house sash. The repairs and extension of the structure took place when old church arrangements had not the position in the public mind which they now occupy.

The elevated site of the church, and of the abbey on the eastern cliff, is attained by a hand-railed flight of 196 steps, termed the church stairs.

Whitby, on the whole, is an interesting place, and the first of the two volumes above referred to, to which we are mainly indebted for these few notes on it, contains a full account of the town and its history, buildings, and neighbourhood. The "Guide" is a smaller work, which, for a shilling, gives a more limited account of all the objects of interest at and about Whitby, with an Essay on Sea-bathing, by Dr. J. Dowson. Both volumes contain maps of the district.

The neighbourhood appears to be advancing. Good free stone abounds, and is in great demand.

LODGING HOUSES IN DRURY LANE AND ISLINGTON.

ALTHOUGH something has been done in erecting proper houses in various parts of the metropolis, there is wide scope for the exertions of private individuals, who,—seeing the sure effect of wise arrangements on health and life, and believing that by conducting such places in the ordinary business-like manner, they can be made to pay a fair per-centage on the money invested,—may be led to build houses for the use of families, and adapt others for single men.

The large cost of ground in the metropolitan districts, and some other reasons, cause difficulties, but in several instances such experiments have been very successful.

Since the establishment of lodging-houses for single men by the two societies for the improvement of the dwellings of the industrious classes, several places on a similar plan have been opened with varied success. We have before referred to some of these, and may now glance at the "Drury Chambers" (Nos. 3 and 4, Pitt-place, Drury-lane). These are old-fashioned houses, of considerable size, which have been put into thorough repair, well ventilated, and opened as lodgings for single men. Under the care of the inspectors of lodging-houses, the beds have been so arranged according to the space, that over-crowding is prevented; and for 4d. a night, or 2s. a week, including Sunday, a man may obtain a wholesome lodging. The bedding is very clean; and at the time of a chance visit the place seemed well managed and cared for. A kitchen or sitting-room is provided for the men, with locked cupboard for each; and it may be expected, notwithstanding the considerable amount which has been expended, that the manager will gain a good income from the speculation.

When we remember the former condition of the majority of the lodging-houses of this class in many districts of the metropolis and in the provincial towns, the contrast is satisfactory. In such places as these men have the opportunity of association without the need of resort to the public house. In winter time there are a comfortable fire and light. The police inspectors of lodging-houses—intelligent men, who, on all occasions on which we have had the opportunity of noticing their operations, have been remarkable for the kindly yet firm manner in which they fulfil their duties—see carefully to the drainage, and by their timely visits enforce a degree of order and cleanliness which is as beneficial to the lodgers as to the keepers of the houses themselves.

Formerly the houses for the reception of travellers in the suburbs, and in St. Giles's and other parts of London, were, in most instances, frightful places, in which either decency or morality was next to impossible. Men with wives, and families of children of different ages—in search of work or from some other causes obliged to take the road—had often no other choice than to resort to those places, where they were forced to associate with the most depraved and profligate.

Barred doors prevented visits of the police, and such was the nature of the people hoarded there, that it was a matter of no little danger for those who meant kindness to venture into the neighbourhood. Persons of both sexes, old and young, were huddled together, and the uncontaminated boy or girl was thrown into close connection with those versed in vice.

It is difficult to estimate the damage that resulted from such association,—the amount of robbery, and systematic begging and imposition, which was reared and encouraged by the ill arrangements of these terrible resorts of the poor and depraved. As a contrast to these, we may look at one of the houses for travellers, situated in Islington, which is much resorted to, and i registered, and looked after by the police inspectors of lodging-houses. This is situated in a

* Whitby: its Abbey and the Neighbourhood. By F. K. Robinson. Whitby: S. Reed. 1860.
Reed's Illustrated Guide to Whitby. Sixth edition. Whitby: S. Reed.

narrow court, which, but for care, would be a nursery for fever and disease. The lodgings consist of several houses: by means of many contrivances—which are not very apparent to the eye unpractised in those matters—a fair amount of ventilation is managed; and perhaps, in such conditions, it is as well that the means of ventilation be not too apparent; for those who have been accustomed to lodge in close, impure atmospheres, seem to have a strange aversion to the admission of air, and possibly would keep it out. Doors have, however, been taken off, and panels taken out of cupboards, which answer a good purpose. Some rooms are fitted up with beds for men, which are placed at the distance legally allowed.

No miscellaneous hoarding together of men and women is allowed in these apartments; there are, however, some of the rooms arranged for the use of married men and their families. In these places, a partition is placed at such a height as ensures a certain amount of privacy, and still allows ventilation. It would perhaps surprise some accustomed to affluence, and who have not looked at the condition of the London poor, to see the rough accommodation for travellers we are praising. Great, however, is the improvement which has been made; and it is something to know that, although the arrangements are not of the most refined description, here people, at the cost of about 3d. a night, can sleep without the fear of evil communications, fever and pestilence.

According to the terms on which those houses are licensed, it is necessary to whitewash all the rooms at stated intervals, to prevent damp, and do proper repairs; to change and properly keep clean the bedding; to trap and keep clear the drains. A sufficient water-supply is also required. The opposition will be remembered which was made by even those who were dying by the hundred annually through the ill conditions in which they were placed. Now, however, not only the tenants, but those who let the houses are thankful for the change.

Some of the courts close by, in Islington, are differently managed, and need supervision. In these places there is a large population. We will not just now mention the names. They ought, however, to be well known to the parish inspectors. The closets are insufficient for so many occupants, and the condition of them in the morning on which we called was abominable. The usual complaint was made of short supply of water. Few would think, on first looking at the dilapidated dwellings, that they were inhabited: it will be found, however, that working men and their families thickly populate the place. In passing through the apartments it is evident that the want of proper closets, conveniently attached to houses which are let in tenements, is the first requirement which should be attended to. A visit to some of these miserable London interiors is indescribably painful. In one room, occupied by a blind woman, there was not an article of furniture: a few dirty shavings in a corner served for a bed. In another room a child lay seemingly at the point of death. Terrible must be a sick bed in such a situation, and sad it was to find a man in the last stage of consumption in a place close by. With several miserable pictures stored in the memory, squalid figures relieved by mouldy, damp, and decaying walls, and other scenes of dirt, confusion, and neglect, we can but wish earnestly for the means of improving such a state of things.

We are told that house property in these courts is of little value in its present condition. Surely, however, those persons in whose charge the houses are, should see that they are kept in a decent condition. In some courts, small casks, bottles, and a variety of odd vessels were waiting for the water supply to come in. Most inconvenient and insufficient is this arrangement. In another court (Ashley-court) the people can draw water at any time from a tap which is placed in a convenient part of the court. Some of these courts exhibit such different degrees of cleanliness and care, that much evidently depends on the exertions of the persons who own or have the superintendence of the houses.

In some of them, indeed, it is evident that as much is done by the owners as can reasonably be expected, and that the tenants repay the endeavours by decent behaviour and carefulness.

THE TOMB OF HARVEY.—It has been determined by the College of Physicians, with the consent of the next of kin of the illustrious discoverer of the circulation, to restore his tomb at Hempstead church in such a manner as to secure his remains from the desecration and destruction to which they are now exposed.—*Lancet.*

ON THE MECHANICAL EFFECT OF COMBINING GIRDERS AND SUSPENSION CHAINS, AND THE APPLICATION OF THE SYSTEM TO PRACTICAL PURPOSES.*

AT the meeting of 1857 a paper was read by me on this subject, my attention having been directed to it by being required to investigate, as engineer-in-chief to the Londonderry and Enniskillen and Coleraine railways, the best mode of connecting the railways across the River Foyle, in conjunction with a road bridge. The depth and bad bottom of the river led me to recommend a suspension bridge, combined with a girder; and, in order to investigate the strain and the amount of girder power required to cure the oscillation and wave, the model was made which I now submit to the meeting.

The design, when submitted to the Commissioners of the Road Bridge, was approved by Sir William Cubitt, their consulting engineer; but, some doubt having been suggested as to the fitness of suspension bridges for railway traffic, the question was submitted to Mr. Hawkshaw, who recommended the girder bridge now in course of erection by the Road Commissioners, at their cost.

It is, no doubt, the safest course for an engineer to recommend what has been done before, and to avoid experiments; but this, it is contended, does not render it less desirable that the subject now before you should be understood as a mechanical question, as it is admitted by the strongest opponents of suspension bridges that they are practicable and advantageous when large spans cannot be avoided, and we have as a fact the Niagara bridge of 822 feet span, constructed principally of timber, in a situation exposed to severe hurricanes, which has carried over for six years the heavy goods and passenger railway traffic of the New York Central and Great Western of Canada Railways.

It is not, however, in cases where large spans are indispensable that this principle of construction is alone advisable. In the case of the Londonderry bridge it is not impracticable to construct piers in the river, but they are attended with serious risk and cost and interruption to the navigation, which, in the opinion of Sir William Cubitt, might have been avoided, and a superior engineering work made at less cost.

The same occurs in London. The Hungerford Suspension-bridge has become the site of a railway extension, and it is at once assumed that for railway purposes suspension is inadmissible, and this bridge, so ornamental to the river, is to be superseded by a girder bridge with numerous piers, I believe for no other reason than because the mechanical effect of the combination of chains and girders is not sufficiently understood, and for this reason I desire to press the investigation of the subject. But referring again to the Niagara bridge, which is 822 feet in span, and of which the girder portion is of timber; if this bridge will stand heavy railway traffic, can it be doubted that a bridge entirely of iron of the best quality, or the improved material puddled steel, can with safety be constructed of much larger spans?

But it is not only to avoid the difficulties of rivers that a successful suspension girder bridge would be useful, but in many cases valuable property may be saved, and even the difficulties of dealing with the crowded traffic of the streets of London very much diminished.

A suspension girder bridge of spans of 2,000 feet is perfectly practicable, constructed with superior metal, but 1,000 feet is sufficient to meet the difficulties of the case, and lines of railway can thus be easily carried across a crowded city at less cost and with less destruction of property than by underground railways or any other means than has hitherto been suggested.

I shall speak subsequently more in detail of the cost and practicability of such lines of communication, but it is necessary now to say a few words to justify my claiming the attention of the meeting to the subject.

The principal cost of a structure consisting of a series of openings will be the suspension wires or chains and the towers. The amount of girder power to cure the wave and oscillation will not be found, as my experiments will show, to be a serious addition to the cost, and the item in ordinary suspension bridges which forms the largest proportion, viz., the anchorage, will here be divided over numerous openings.

With reference to the chains or wires, the most ready estimates will be deduced by reference to any existing structure, and I select the Niagara bridge as the only one tested by railway traffic. Here we have a section of 242 inches of wire with a weight of 350 tons, a span of 822 feet, and a deflection of 59 feet.

In a series of spans the suspension chains, irrespective of the towers, would form fully half the weight of metal in the structure, and assuming a price of 40*l.* per ton, we have 12,400*l.* for each opening as the cost, assuming that for the purposes of omnibus traffic we require an amount of strength which has been found *sufficient* in a locomotive railway of heavy traffic, combined at the same time with a separate carriage road communication.

The rule for ascertaining the sufficiency of railway bridges adopted by the officers of the Board of Trade is to estimate the strain produced by the greatest weight which by possibility could come on the bridge throughout every part of the structure, which should not exceed one-fifth of the ultimate strength of the mettle.

The strength necessary, therefore, depends in a great measure on the mode of traction adopted, and it is therefore a very important question in this case to consider whether locomotive steam engines are the best mode of traction where the traffic will be entirely of an omnibus character, requiring trains as frequently as every four or five minutes to give efficient accommodation and relief but of the lightest character.

Parsey's Air Engine may be well adapted to the purposes of such traffic. Although it may be justly condemned as applicable to the ordinary railway traffic, it has advantages where the tractive power required is not such as to exhaust the reservoir of power and require high pressure too rapidly, which will not be the case in the present application, partly because the trains will be very light, and partly because at every pier or tower small stationary engines will be used for the purpose of raising the passengers from the surface of the ground to the platform of the railway, which would furnish a supply of compressed air for the renewal of the reservoir of the air locomotive. Without entering further at present on the question of the practicability of this suggestion, or whether the atmospheric or any stationary system may be so, as it is assumed that such a system of traction is adopted, or that a locomotive of one half the weight only of ordinary locomotives, such as I am now employing on our railways, is required, and therefore the ultimate weight which might arise on such a bridge would not exceed one half of what might occur on a railway bridge, assuming the extreme case that it be loaded from end to end with locomotives.

It is generally considered that a bridge for ordinary road traffic does not require to be made of the same strength as an ordinary railway bridge, but this I believe to be an error. A railway bridge covered from end to end with locomotives is a possible strain to which it may be subjected, but in a large span it is a less possible or probable contingency than that of a road bridge being densely packed with passengers or soldiers, by which a greater actual weight would arise with a greater amount of vibration, while bridges with a motive power like Parson's engine, or stationary power of any kind, would not be liable to an ultimate strain of one half that of a bridge for ordinary road traffic.

It is true that many failures have occurred in suspension bridges, which fact has much shaken public confidence in them, but it is only necessary to examine the causes of their failure to see that they were the certain results of the defect of construction, and when these cases are examined they become evidence of the advantage of the principle, not of its defects. If road, like railway, bridges had been constructed under the supervision of the Board of Trade, not a single failure would have occurred, and when it is stated that these bridges have been constructed with from one-fourth to one-sixth the section of iron that the Board of Trade would require, and without any means of correcting the wave and vibration, it is not surprising that they have failed, but rather that they have existed so long, and that some of them now exist.

The public may rest satisfied that any bridge which has passed the approval of the Board of Trade is not only sufficiently strong, but much in excess of the necessary strength, and they can as safely reside under such a bridge as under the roof of a house, and it is in accordance with these rules that my estimate is formed.

The section of metal in the suspension chains or wires required for a double line of railway with a span and depth equal to the Niagara Bridge, with girders constructed of good iron to comply with the Board of Trade rule, would not be more than 240 inches, and I propose to adopt this

* Read at the Oxford meeting of the British Association, by Mr. Peter W. Barlow, F.R.S., as mentioned in our notice.

section; that is to say, to give the same strength to my structure for light railway passenger traffic as has been given to the Niagara bridge, which has a road communication in addition to a heavy railway traffic, in a situation exposed to the most severe hurricanes.

We thus arrive approximately at the main cost of the structure, viz. the supporting chains which will contain 2,000 tons per mile, which at 40*l.* per ton will be 80,000*l.*

We have next to consider the cost of the towers or piers, which I propose to construct of wrought or cast iron, and we have the Crystal Palace water towers as an example of a similar structure from which the cost may be deduced. These towers are 220 feet in height and support 1,800 tons of water at the top. The towers required for such a bridge as I have described will not have so much weight to support, and the height will not exceed 150 feet, and allowing the same section of metal and strength, the cost will not exceed 10,000*l.* each tower.

The next large item is the cost of the girders and the platform necessary to prevent the undulation or wave—a necessary addition to every suspension bridge, but one which has hitherto been generally neglected; and thus has arisen the want of confidence in a mode of structure which admits of numerous applications of great public importance.

The investigation of this part of the subject is the immediate object of this paper, as the strains and necessary weight of metal in the main suspenders has been long calculated and fully established; but for the purposes of the approximate estimates, I shall only here state that a weight of metal equal to the chains will be found to be sufficient at a cost of 60,000*l.*, and thus a total cost, allowing for land and other contingencies, of 300,000*l.* per mile, would carry such a structure through the densest part of London; a sum small, compared with the object to be obtained, and which will probably be much reduced on further investigation, as it accomplishes the object of railway communication without any interference with the sewers, water-pipes, &c., and with less destruction of property than a tunnel, which will be unavoidably most unpleasant for passengers, and more objectionable for the application of steam and locomotive power, that a viaduct, where if Parsey's system or stationary power does not admit of practicable adaptation, light locomotives may without difficulty be used.

I am, however, dwelling more on this part of the subject than the title of my paper justifies, my object being merely to show that, if a system of larger spans can with safety be established for railway purposes, that there are many instances of useful application to the public.

General Remarks upon the Construction of Bridges of Large Span.

Bridges may be divided into three classes:—

1st. The arch—a structure in which the supporting material is subjected to compression alone, but which contains no rigidity in itself.

2nd. The suspension bridge, in which the supporting material is subjected to extension alone, which also contains no rigidity in itself; and

3rd. The girder, in which the material is subjected to both extension and compression.

Of these three systems, the girder necessarily requires, from combining compressive and extensive resistances, a much larger amount of metal than either of the other systems.

In an ordinary arch, the compressive force is resisted by the abutments, which in no way add weight or strain to the metal; but if the arch is converted into a girder, it can only be done by adding a tie-bar, the arch having then to support its own tie, or substitute for an abutment, in addition to its own weight.

In a suspension bridge the tensile force is resisted by the anchorage, and if these are taken away to make it a girder, a compression tube or bar has to be used as a substitute for them (as in the Chepstow Bridge), which tube becomes, in large spans, with its supports, by far the largest portion of the structure, and destroys the bridge by its own weight, besides doubling the deflection.

It is thus evident, that if you convert a girder into an arch or suspension chain of the same depth, half the supporting material is at once dispensed with, from the duty being transferred to the abutments or anchorage, and the deflection decreased one half.

Thus, theoretically, an arch will produce the same saving as a suspension chain; but it is not so in practice, because there is much greater difficulty in dealing with compression strains than with extension. In the latter case, the strength is correctly measured by the section of the metal; but where you have compression strains to deal with, wrought iron is liable to buckling, and you thus cease to have any true measure of its strength and power of resistance, a difficulty which arises not only in larger iron arches, but occurs also in deep girders, and thus limits their extent of application.

Mr. E. Clarke, who published an account of the Britannia Tube, concludes his investigation of the subject by arriving at a similar conclusion, in which he no doubt also expresses the views of Mr. Robert Stephenson. In speaking of the limits to which tubes similar to the Britannia would be carried out, he says:—

"If the dimensions of the section remained constant, and the length only were increased, the tube would break with its own weight when it became about 850 feet long.

But if the dimensions of the section were also increased so that the tube retained the same proportions, becoming then a similar tube to what it is at present, it would break with its own weight when it became about 1,570 feet long. The depth of the tube would in this case be 100 feet; the breadth 48 feet; and the weight 62,000 tons.

Other curious properties of similar tubes may be determined from the preceding reasoning; but in practice these theoretical limits cannot be approached. The impossibility of construction, the rapid increase in the weight of the requisite pillars for any great extension of depth, the necessary additions for preserving the general form of a large structure, considered merely as an edifice, independent of its action as a beam, and the great crushing strain to which the bearings would be subjected, are all elements increasing in a high ratio with the dimensions, and rendering impossible, on similar principles, any structure of much greater magnitude than the Britannia Bridge. This will be evident if we call to mind that in that tube 21 *per cent.* of the whole weight of the sides is already consumed in stiffening them; and not only would the weight of a larger structure increase as the *cube of its length*, but it would also require a much larger *per-centage of stiffening plates in the sides*, for as the pillars increase in height, the weight increases as the *cube of the length*, while the strength is only as the square.

In this respect the ordinary suspension bridge possesses considerable advantages over other structures, for the strain being wholly tensile, the laws of pillars do not come into operation, and such bridges may be safely constructed of *magnificent dimensions with little material.*

These advantages, however, at once disappear when the horizontal strain is resisted *by a pillar* forming a portion of the structure itself, as in the case of the Chepstow bridge; and the limits of such a system are nearly similar to those of a tube, the weight per foot run increasing nearly as the square of the length, and therefore the weight of the whole structure as the cube.

The magnitude of the arch is limited, like that of the beam, by the danger of *distortion*, its stability being dependent on the laws of pillars. The thrust on the abutments becomes, moreover, a formidable difficulty in arches of great magnitude."

These observations, which are, however, much at variance with the arguments which decided that the suspension-bridge of Telford should be superseded, I fully concur in, and they are very important. It must be admitted, at all hands, that a structure whose direct strength depends on the resistance to the extension of iron, is safer and of greater strength than one which depends upon its compressive resistance. Firstly,—because the extensibility obeys known laws, and metal is superior in tensile strength: secondly,—for the reason previously described, that you avoid the necessity of loading your bridge with material to produce compressive resistance: and thirdly,—because the deflection varies nearly as the square of the depth, and you can have increased depth in a suspension-bridge with little additional material and cost.

A comparison of existing structures will at once prove this, and as an example I will mention that the two tubes of the Britannia bridge contain 2,500 tons of supporting material in a span of 460 feet, while the Niagara bridge, of equal strength and of 822 feet span, contains only 350 tons.

In the face of such undeniable facts, it is surprising that a system of parallel girders for large spans has been adopted, the safety of which, as regards direct strength, is not so certain because you depend on compressive resistance, which may suddenly fail from buckling, as you cannot estimate where it will occur from experiments on a model, and you are therefore only certain of the strength of your structure as far as you actually test it, and have not that margin of the excess of certain strength to allow for deterioration which it is desirable to obtain.

As these advantages of suspension structures must be obvious, the question at once suggests itself, why have they been abandoned for railway purposes, where safety is so important?—the only answer to which is the supposed practicability of curing the oscillation and the wave produced by a passing load; and it is to the investigation of this important subject that my experiment and observations are directed. The first objection of the oscillation or swinging produced by a hurricane is not a serious one, as the force of the wind will only occasion mischief in combination with its action on the timber platform of the bridge, producing undulation and waves, and has been cured by Mr. Rendel by the addition of a girder parapet of wood. It could not occur in bridges with an iron platform, and stiffened by a girder of good iron, presenting comparatively little resistance to the wind; and I have therefore directed my experiments alone to the cure of the wave.

For the purpose of my experiments I had the model made which I now lay before the meeting, which represents one opening of the intended Londonderry bridge, $\frac{1}{33}$ of the intended size, the length between the towers being 13 feet 6 inches, which it is submitted is of sufficient dimensions to deduce accurate results when large compression strains are not the subject of investigation.

To illustrate the object of my experiments, I will again explain that a suspension chain, *per se*, has no rigidity in itself; a weight placed on any part will instantly distort the figure, and the platform will take the form of the wave: and thus the numerous bridges erected on this principle, without a means of correcting the distortion, are unfit for the purposes of traffic of any kind.

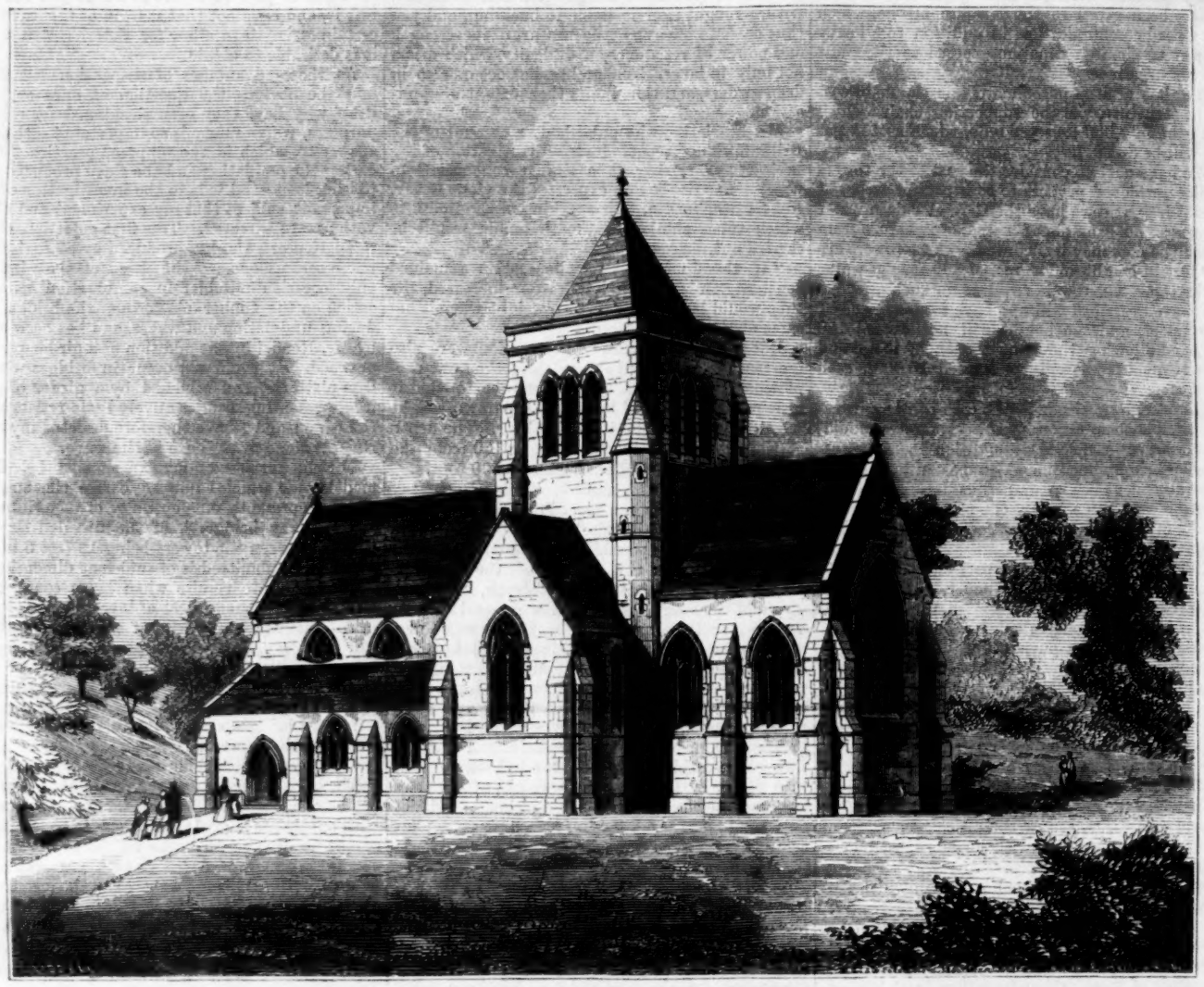
The obvious correction for this undulation, which has been adopted by Mr. Rendel and Mr. Rouhlin with success, is a girder attached to the platform of the bridge, so that the weight is distributed and the waves diminished to such a degree as to be unobjectionable in practice; and the mechanical question for consideration is the amount of wave which will arise with a girder of a given depth and section of iron.*

THE "IRON HORSE" MAKING A NEW START.

We see it reported in the Banff and Wick papers that Lord Caithness has had a carriage fitted up on something like the locomotive principle, and has travelled on it with considerable rapidity, up hill and down dale, in the rough and hilly north, as well as along level roads and through crowded market-places; the whole apparatus, it is said, being as completely under the command of the noble driver as would have been a carriage-and-four or a mail-coach. With this carriage the Earl of Caithness and his Countess are said to have paid visits to friends, and completed a journey of some length with the speed of the old "mail," and with great success. Does not this now at length foreshadow that the day may yet after all arrive when the horse, being no longer necessary, may become a curiosity, as the skeleton of the mammoth in the British Museum, now is?—that, even in warlike operations, instead of cavalry mounted on horses, and now less efficient on account of the use of "arms of precision," we will have regiments of stalwart men mounted on "iron horses," as our primitive British forefathers had their perhaps apocryphal iron war chariots, extremes thus meeting, *but with a difference*, even in the wild and savage war screech with which they will rush upon the foe?—that in more peaceful scenes even fair ladies may call for their steam horse, so tamed, that with it they will fearlessly roam through the streets of the West-end, the parks, and other places of fashion? What will they do with the grimy smoke? may some say; but are we for ever to be unable to consume our own "blacks?" Let us at all events console ourselves with the idea that coal, as a means of propelling the locomotive, may not be always necessary! Electricity would be cleaner: even the German baron's compressed air-bottles of iron, or some still simpler motive power, may one day replace it, at least in the new equivalent for pony carriages, cabs, and riding horses.

The revival of the locomotive carriage for common roads is not so likely now to have its progress checked as it was when the rail shot ahead of it; and it is to be hoped that no renewed infliction of heavy tolls will again stupidly interfere with it.

* To be continued.



KILMORE CATHEDRAL, IRELAND.

KILMORE CATHEDRAL, IRELAND.

Kilmore Cathedral, of which we give illustrations in our present number, was consecrated on Tuesday, the 17th of July last, by the bishop of the diocese, in presence of a large number of the clergy.

The old cathedral, whose place it supplies, was a mere square room, with flat ceiling and gallery, quite inadequate for the accommodation of the parishioners.

The new building has been erected from the designs of Mr. William Slater, of Carlton Chambers.

The style selected is Middle Pointed. In plan the church consists of nave and aisles, north and south transepts without aisles, and chancel also without aisles. The tower is central: it is carried up one stage above the roof, and terminated by a four-sided pyramidal roof.

The west door is double, with a carved tympanum. The roofs of the nave and transepts are open, with carved braces supported on columns: in the chancel the roof is panelled. In designing the building two objects were kept in view,—the first, to provide suitable and increased accommodation for the parishioners; the other, to preserve, as far as possible, the distinctive cathedral arrangements. To accomplish these, the nave and aisles and south transept are filled with convenient open seats for the general congregation.

The north transept is occupied by the organ, which stands on the floor, and by the children of the schools. Under the tower are placed the stalls for the clergy and choir, and the bishop's throne: all these are of oak, and richly carved by Mr. Forsyth, of London, from the architect's designs. The chancel proper is left unoccupied by seats, and is thus available for confirmation or gatherings of the diocesan clergy, and the like. The pulpit is placed at the north-west part of the tower, and the font in the nave, at the west entrance. These were executed in Dublin by Messrs. Purdy & Outhwaite, who also carried out the stone carving.

There are at present only three stained glass windows in the church,—two in the south transept, executed by Mr. Miller, the gift of the Nisbitt family, and one in the south aisle, by Messrs. Clayton & Bell. The chancel is paved with Minton's encaustic tiles.

The general works were carried out by Mr. Hague, builder, of Cavan. The materials used are dark local stone for the general walling, and a lighter stone, from Dungannon, for the dressings. The external effect is much increased by the site, which is on the slope of a hill.

The funds have been provided by the bishop, assisted by private benefactors and a grant from the Ecclesiastical Commissioners.

CONDITION OF THE POLICE COURTS.

In the police-courts of the metropolis, which day after day are crowded, may be noticed examples of the dangerous classes who are to be met with in the dismal and neglected neighbourhoods of London, but who, except in troubled times, are but little known to the more prosperous inhabitants.

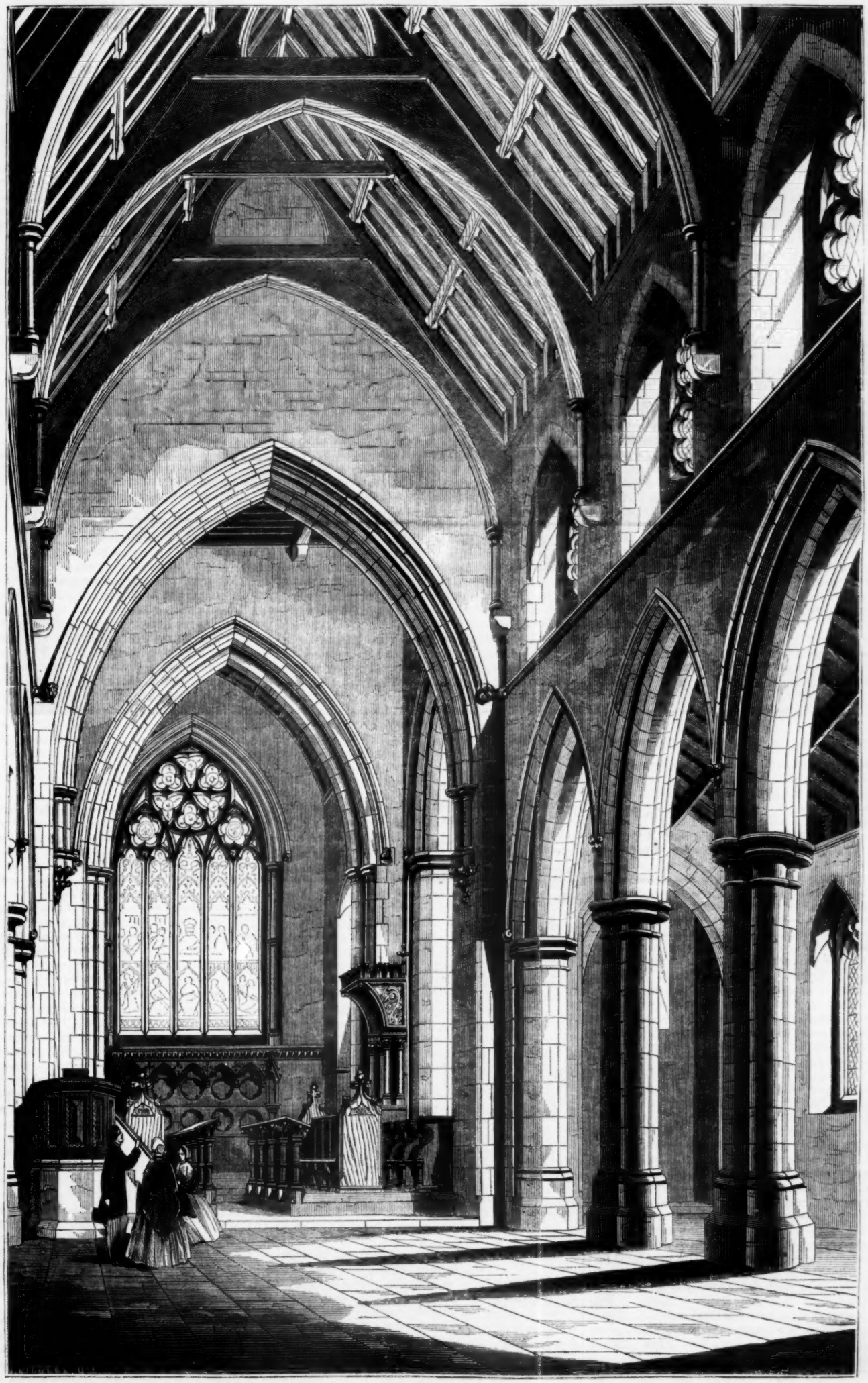
Terrible are some of the countenances which may be seen, and so great and singular is the contrast, that the skilled painter might here form impressive pictures. In the waiting-rooms, most of them bad in their sanitary arrangements, may be observed all grades of people. Some of these courts are so unwholesome in their arrangements that they cannot fail to shorten the days of those whose duty it is to be in constant attendance there, and are most pernicious to those who have occasionally business to transact. It is singular that, in those places where the law is generally well administered, such ill arrangments should be allowed.

In Clerkenwell Court, a place of but recent erection, striking defects may be noted. In the waiting-room, which is often densely crowded on a hot summer's day, the most simple means of ventilation are neglected. As such a large number of people are often kept waiting here sometimes for hours, there should be, besides the windows, an opening into the chimney, near the roof; and, as the door-way is usually blocked up by persons, there should be another opening above the door. It might be thought that the fireplace would help the ventilation; but, strange to say, the register of the stove is carefully closed; at least it was when we looked at it.

Here were sergeants of the useful sanitary portion of the police, who might give a beneficial hint in such cases. In the magistrate's private room and some of the other offices leading from the long passage which stretches to the court, a little care would improve the ventilation. At the further end of the passage mentioned there is a door, which, during the most busy part of the day, is kept closed. When last there, notwithstanding that the windows which range along one side were open, from the want of vent, at and beyond the door we found the atmostphere stagnant and oppressive. In the seats were women and children, and the place was thronged with other persons who were waiting as witnesses, or had been summoned for other purposes.

Persons unaccustomed to such places complain of the effect which the heavily-loaded air has upon the spirits. Children either doze into an unnatural kind of sleep, or become fractious; and doubtless, besides the inconvenience at the moment, future damage is done. The court here is of fair proportions, and well lighted; but, as we have said, there are needed further means to promote the circulation of air, perhaps more particularly in the winter time, when the windows are kept closed, than in the summer.

In the Guildhall Police-court, which has been altered, the arrangements are now very good. A large space has been provided for the accommodation of the public. The room is large, and the ventilation well managed. This now contrasts agreeably with the accommodation in the Courts of Exchequer, &c., near the Guildhall, and the Lord Mayor's Court at the Mansion House. The latter is even worse than Bow-street, and calls loudly for great improvement.



INTERIOR OF KILMORE CATHEDRAL.—Mr. William Slater, Architect.

ARCHITECTURAL PHOTOGRAPHS.

Messrs. Thompson & Co., of Pall-mall, propose to publish a series of Architectural Photographs, on the 1st and 15th of each month. They profess that they intend to issue only first-class, carefully-printed, impressions, of really good and interesting subjects, at an unusually low price; and they have engaged the co-operation of Mr. F. Bedford, by whom all the photographs will be taken.

They propose to include, in the series, "Illustrations of Mediæval Ecclesiastical Architecture—Exteriors and Interiors; Mural, Monumental, and other Sculpture; choice or remarkable examples of Civic and Domestic Architecture; Picturesque Ruins, and various other noteworthy subjects of a more or less rigidly technical character, interesting to architects, artists, archæologists, literati, and persons of taste generally."

Each view is to be 11½ inches by 9½ inches, mounted on board, 18 inches by 14 inches, and singly will be sold for 6s.: to half-yearly subscribers, each will cost 5s.; and to yearly subscribers, only 4s. 4d.

We have before us half a dozen of the photographs prepared for issue, including an excellent view of Lichfield Cathedral (and giving the whole height of the spires); the Tower of Wrexham Church; Roubiliac's Monument to Mrs. Myddleton (not a wise choice); and the monument erected to the memory of the late Venerable Archdeacon Raikes, in Chester Cemetery, from the design of Mr. Penson. Mr. Bedford's name gives sufficient assurance that the photographs will be good *as* photographs. Everything will depend on the taste and tact employed in the selection of subjects.

PARIS.

The deep foundations that are being taken out, in order to continue La Rue des Halles on the site of the ancient market-place, bring to light, every day, a large quantity of human bones, belonging to the cemetery of the Innocents, and which have been carefully collected for re-interment. Now situated in the centre of Paris, the cemetery of the Innocents was primitively established outside the boundary of the town, between the two bourgs of Saint Germain-le-Neuf and Saint Germain-le-Vieux, the Beau-Bourg, and the Bourg l'Abbé, near one of the north of Paris gates, at the junction of the Saint Denis and Montmartre roads.

From the time that Philippe-Auguste had it properly enclosed until its suppression as a burial-ground in 1785, it never ceased to receive funerals from twenty different parishes. The number of persons buried increased extraordinarily every year. The last grave-digger, Nicolas Poutrain, within the space of thirty years, had laid down to rest, according to his notes, no less than *ninety thousand* human beings. Thus, the number must have been about 3,000 each year, most of whose remains were heaped up in a common grave from 5 to 6 mètres deep. It has been estimated that as many as 1,200,000 were interred in this cemetery from 1186 to 1785, or within about 600 years.

The fatal incidents which have occurred from time to time during the last century, in different *quartiers* surrounding the cemetery of the Innocents; the complaints of the inhabitants, who attributed to this focus of putridity the fœtid state of the well water; and the disappearance of generations by result of fever from the above emanations, called the attention of the authorities; and the Council of State, by its decree of the 9th of November, 1785, pronounced the suppression of the cemetery of the Innocents. The ancient quarries situated under the plain of Mont Souris, at a place called the Tombe Issoire, appeared the most convenient for the establishment of a subterranean cemetery. Thus originated the catacombs of Paris, which became the depository of the bones of all the churchyards of the capital, not far from the new little square of the Halles, where the restored and repaired fountain of Jean Goujon refreshes the verdure.

A steam fire-engine was tried in the Champs Elysées a few days ago. Placed in communication with one of the water-cocks of the grand avenue, it threw a jet higher than the roof of the Palais de l'Industrie. The advantages of such a machine are incalculable, both from the quantity of water and the force of projection.

The works of the tower in course of construction between the Church of Saint-Germain-l'Auxerrois and the Mairie of the first arrondissement are drawing to a close. Already, notwithstanding the surrounding scaffolding, one can form an idea of the effect of this structure, whose height is not less than 40 mètres. It stands on a square base 7 mètres on each side, the faces being pierced by trilobed ogival windows. Hexagonal counterforts or buttresses, separated by arches, flank the upper story, and a gallery with open work balustrade runs round the higher story, which is of octagonal shape. Statues of saints and kings will be placed on the different stories, and they are now receiving the finishing touch for the statuary.

The fountain of St. Michel is nearly finished: the bronze statues of the cardinal Virtues have been put in place. These statues, nearly 3 mètres high, stand on capitals of white marble, supported by four columns of red Languedoc marble, and placed in pairs on each side of the central niche, to be occupied by the group of Saint Michel, which has been already cast, and is being cleaned up. The two stone figures of the upper façade,—Power and Moderation,—are completely terminated, as are also the different bas-reliefs, bronze shields, marble tablets, and other sculptures and ornaments which enter into the composition of this work. Two enormous eagles, of hammered lead, are being put up at the angles of the pediment, to whose ornamentation they will add, and at the same time mask the house against which the fountain is reared. A number of carvers are finishing off the marble fountain in which the waters are to play on the 15th inst., the *fête* of the Emperor. On this occasion the scaffolding and canvass will be removed, and the public will be able to gaze upon this important public work, destined to mark the entrance of the Boulevart de Sebastopol on the left bank of the Seine.

The works of the Cathedral of Notre Dame are drawing to a close. New statues have been placed in the vacant niches of the *Galerie des rois*, on the west front; and in a few days the twenty-eight niches which compose this group will be be completed. An immense scaffolding covers, at present, the southern façade of the transept, by means of which the last finishing work will be given to this important restoration. The grand rose on this side is shortly to be demolished and reconstructed, on account of its dilapidated state: all the portions are ready for putting up, so that much time will not be lost. The new central spire, almost clear of scaffolding, now appears with all its elaborate ornamental work. The plumbers are putting the last touch to the lead-work of the base, also to the ornamental ridge fret-work of the roof of the nave. Before the year is out the cathedral will be finished and given up to the parochial authorities.

ART AND RECREATION IN THE COMMONS.

In course of an incidental discussion on the National Gallery last week in the House of Commons it was intimated, on the part of the Government, that they approved of Mr. Pennethorne's plan for a new gallery in preference to Captain Fowke's for an alteration of the present building, even although the latter would only cost from 30,000*l.* to 50,000*l.*, while the former would cost probably 200,000*l.* Captain Fowke's plan, it was thought, was either too extensive for a mere alteration, or not extensive enough. In course of the discussion, Lord Palmerston said it was desirable, if they could, to make some final and permanent arrangement, to provide for the whole of this subject. The question came to this, whether, by the outlay of some small sum for a short time to come, upon the present building in Trafalgar-square, the immediate want could be provided for, so as to render it unnecessary to embark upon the large expenditure which would be necessary in order to build a new National Gallery on the site of Burlington House. As the matter must come forward again on a future occasion, he would simply point out that that would be the question which would then have to be discussed. In reply to a question put by Mr. Coningham, Lord Palmerston said that in the belief that Sir C. Eastlake was a most proper person for the office of director of the National Gallery, he had recommended her Majesty to re-appoint him, and he had been re-appointed accordingly.

On the supply question of a vote of 100,400*l.* (which was finally granted) to defray the expenses of the royal pleasure-grounds and parks, a discussion ensued of a miscellaneous character as to the parks, the new ride, &c. Lord John Manners said, as to the ride, the argument in favour of the riding part of the public might be carried too far, because a far greater part of the public rode in cabs and carriages than on horseback, and, to be consistent, the right hon. gentleman (Mr. Cowper) should throw open the road to carriages (omnibuses and cabs inclusive?) as well as to people on horseback.

With regard to the works at the Serpentine, Mr. Cowper said he had, in conformity with Mr. Hawksley's recommendation, had a well sunk for the purpose of providing fresh water, as he believed the principal evil of the present state of the water arose from stagnation. As to any excess in the expenditure, he had Mr. Hawksley's assurance that it would not exceed the sum of 17,000*l.* There would be a power of supplying the round pond in front of Kensington-gardens from the well in question, instead of by the water companies.

With respect to the proposed museum in Victoria-park, he stated that the Board of Works had no power to erect any such building, and he was simply asked to do that which he had no power to do.

As to Battersea-park, there was great want of water there, and it was proved to be more economical to have a well sunk, than to take a supply from the water companies. It would cost just as much money to get water from the river as from a well; and he thought that if Thames water were used in the gardens, Battersea-park was likely to be a very disagreeable place. Mr. Joseph Locke thought the economy of sinking the well so near the Thames was very doubtful, and ought to be more clearly shown. Mr. Cowper explained that sinking the well at Battersea-park would save an annual expense of 300*l.* for watering the gardens, for water for the lodges, &c. Mr. John Locke wished to know why no progress had been made in letting the ground in the neighbourhood of Battersea-park for building purposes. He had no doubt that a great check upon traffic, not only over Chelsea-bridge, but over Southwark-bridge, was owing to the existing tolls. As a matter of economy, it was worth the while of the Government to consider this question of payment of the toll at Chelsea-bridge (particularly as the new railway bridge was nearly completed), in order to make the public property at Battersea as remunerative as possible.

Lord J. Manners said, with regard to the metropolitan parks generally, that, when the parks were established, the metropolis had no special voice in the matter. The legislature made them, and consequently the public, he thought, ought to pay for them.

THE TOWERS AND SPIRES OF LONDON.

The churches of London, which give so much beauty to every view of the metropolis, and have, moreover, so many valuable and interesting associations, are threatened by the "Union of Benefices Bill," now before the House of Commons. The Royal Institute of British Architects, as we have already mentioned, have sought, even if they could not save the churches, to obtain protection for the towers and steeples; and, at their inspiration, Mr. Cavendish Bentinck proposed to the House in Committee, on the 8th, to add these words:—

"Provided always, that nothing in this Act contained shall authorize the pulling down the churches of Saint Stephen, Walbrook; Saint Martin, Ludgate; Saint Peter, Cornhill; and Saint Swithin, Cannon-street; or the towers and steeples of any of the churches within the City of London, and specified in the schedule to this Act annexed."

Further, to insert the following clause:—

"In case any of the churches specified in the schedule to this Act annexed be pulled down, the towers or steeples of which shall, under the provisions of this Act, be required to be left, every such tower or steeple shall be considered to form part of the church of the united parishes, and be repaired and sustained in the same manner as such united parish church is repaired and sustained."

That part of the first clause which defends the four churches specially named was carried, but the remainder was not; and some further efforts to preserve our steeples are necessary.

On Monday last a meeting was held on the top of St. Paul's; Mr. Godwin (in the chair), Professor Donaldson, Mr. Norton, Mr. Penrose, Mr. Porter, and Mr. T. Hayter Lewis being present; when the various towers and steeples were examined, with the view of saying which should be preserved. The sight was wonderful, and those present found few spires to the destruction of which they were willing to assent. The following memorial was agreed on; and, being afterwards signed by the president of the Institute and such members of the council as could be found, was presented on Tuesday night:—

"To the Honourable the Commons of the United Kingdom of Great Britain and Ireland in Parliament assembled.

The humble petition of the undersigned President and Members of the Council of the Institute of British Architects, sheweth,—That your petitioners have learnt with great satisfaction that on the recent discussion in your honourable House of the Union of Benefices Bill, the

church of St. Stephen's, Walbrook, and three other of the churches built by Sir Christopher Wren, celebrated for their architecture, were expressly exempted from liability to be destroyed under the operation of the proposed Act.

Your petitioners, as architects, beg respectfully to impress upon your honourable House that the appearance and beauty of the city of London arise chiefly from the highly picturesque and beautiful towers and steeples built by Sir Christopher Wren and other architects, which for variety and excellence of architecture are not surpassed by the celebrated campaniles of foreign cities, and which render the aspect of the City from the river and bridges, and other commanding situations, one of the most striking objects in the world, and a just pride to the country and the metropolis.

The City is chiefly composed of brick mercantile buildings of little architectural character, and the loss of some of the towers and steeples which might be of little importance, would detract greatly from the general effect.

Your petitioners beg respectfully to submit, that at a time when your honourable House is voting large sums for the erection of public buildings in the metropolis, it would be a great loss to destroy existing structures of great architectural merit.

Your petitioners trust your honourable House will add to the list of churches already protected some of the other towers and steeples in the city of London.

Your petitioners, therefore, humbly pray your honourable House that the following towers and steeples be added to those exempted from destruction in the Bill before your honourable House, namely:—Saint Alban's, Wood-street; Allhallow's, Bread-street; Allhallow's, Lombard-street; Allhallow's, Thames-street; Saint Andrew's, Holborn; Saint Antholin's, Watling-street; Saint Augustin's, Watling-street; Saint Bartholomew's the Great; Saint Benet's, Thames-street; Saint Bride's, Fleet-street; Christchurch, Newgate-street; Saint Dionis' Backchurch; Saint Dunstan's in the East; Saint Dunstan's in the West; Saint Edmund the King's; Saint George's, Botolph-lane; Saint Giles's, Cripplegate; Saint James's, Garlick-hill; Saint Lawrence's, Jewry; Saint Magnus's, London-bridge; Saint Margaret's, Lothbury; Saint Margaret Pattens'; Saint Mary's, Abchurch; St. Mary's, Aldermary; Saint Mary's le Bow; Saint Mary's Somerset; Saint Mary Magdalen's, Old Fish-street-hill; Saint Michael's, Cornhill; St. Michael's, Queenhithe; Saint Michael's Royal; Saint Mildred's, Bread-street; Saint Mildred's, Poultry; Saint Sepulchre's; Saint Vedast's, Foster-lane. And your petitioners will ever pray," &c.

THE MANUFACTURE OF PAVING TILES.

Before conducting the members of the British Archæological Association over the works at Benthall, as mentioned in our last, Mr. Maw explained the nature of the several processes. He said,—The manufacture consists of two distinct branches, which are essentially different in nearly the whole of their processes. Firstly, the making of encaustic tiles, or those inlaid with a pattern of two colours, which is the re-production of an art limited in Mediæval time to church decorations; but now having a much more extended application. Secondly, the manufacture of plain tiles, and tesseræ of a uniform colour used in the construction of geometrical mosaic pavements, similar in character to those found in the Mediæval buildings in Italy; also moresque and tesselated mosaics, similar to those occurring in Pompeii, and almost all Roman remains in this country and on the Continent. The materials employed in both processes are nearly identical, and consist for the most part of the clays and marls of the Shropshire coal-measures. These, without any colouring matter, together with clays from the south of England, form the red, buff, and fawn-coloured tiles; and, in connection with different proportions of oxides of iron and manganese, the black chocolate and grey tiles. The white and all the richer coloured tiles and tesseræ are formed of a species of porcelain or Parian, the white left uncoloured, and the blues and greens coloured with oxides of chrome and cobalt. The preparation of what is technically termed the body of the tile, which is the first process in the order of manufacture, consists in mixing the constituent clays and other materials with water, and commingling and purifying by passing them in a semi-liquid state through a sieve made of the finest lawn, containing between 10,000 and 15,000 perforations to the square inch. All the coarse particles are by this means removed, and the texture of the clay rendered perfectly fine and even, as well as greatly adding to the brilliancy of the colour. The semi-liquid purified clay is then dried on what is termed the slip-kilns,—if for the manufacture of encaustic or inlaid tiles, to a plastic state; or, for plain or self-coloured tiles, perfectly dry and hard. It is at this point that the two processes diverge and are essentially different. There is also some slight difference in the proportions of the materials used in their composition, but this need not be more than noticed. The encaustic tiles are made of plastic clay; the pattern impressed from plaster of Paris moulds, and the indented surface filled in with different coloured clays in a semi-liquid state. The tile is then allowed to dry gradually to the consistency of wax, and the inlaid patterns developed by scraping off the superfluous clay. For the manufacture of the plain tiles, of one colour throughout, the material, which has been dried quite hard on the slip-kiln, passes through a machine which grinds it to powder ready for moulding, which is performed in steel dies under very powerful screw presses, some of which work to a pressure of 30 tons. Both kinds of tiles, after having been formed, are placed for ten days or a fortnight in the drying stove, an apartment heated by flues up to 80 or 90 degrees; and, when the whole of the moisture is driven out, they are ready for the burning. This is performed in large kilns, the tiles being stacked in fire-clay boxes, termed saggars. The actual burning occupies four days and nights, during which time they are gradually brought up to white heat by the consumption of from 18 to 20 tons of coals; and during another four days and nights are as gradually cooled, occupying the kiln in a hot state for eight days and nights. Great care is necessary in this part of the process to give the correct amount of heat throughout the kiln: if the firing is not carried sufficiently far the tiles are soft and irregular in colour, which necessitates a repetition of the process; and, if carried beyond a certain point, they gradually decrease in size. They are judged of by long narrow tiles termed "proofs," from time to time drawn out of the kilns during the firing. The whole contents of the kiln may be spoiled in a very few minutes. The great bulk of the tiles are employed in the unglazed or biscuit state, the manufacture of which is complete with the burning. They have merely to be drawn from the kiln; and, as they somewhat vary in size and colour, depending upon the precise extent to which the firing has been carried, have to be passed through a gauge, which divides all the larger forms into four distinct sizes. The process of glazing or enamelling is performed by applying a thin coat of paste, made by vitrifying materials on the tiles that have been previously burned, which is converted into a glaze by subjecting to a low red heat in a small furnace termed the enamelling kiln. Glazed tiles are principally employed for both linings and the sides and backs of fire-places, also for pavement in combination with unglazed tiles, with which they form very pleasing contrasts. To those who are interested in statistics, I may mention that we consume every year about 1,500 tons of coal, and from 1,100 to 1,200 tons of clay, and various materials entering into the composition of the tiles, out of which between 20,000 and 30,000 square yards of tiles, tesseræ, and mosaics are manufactured, composed of 700 or 800 distinct shapes, sizes, and colours. About half of these are laid by the paviors in our own and our agents' employment. The principal use of our manufacture is for the entrance-halls and corridors of private houses and public buildings; also for conservatories, verandahs, dairies, and internal and external wall decorations. A considerable proportion is sent to America, India, and the Colonies. Among the principal works we have executed, or have in hand abroad, I may mention the pavements of the entrance-hall of the new University of Toronto; also nearly the whole of Osgoode Hall, Toronto, laid by our own men sent out for the purpose; the entrance-hall of the Hong Kong Club; Deck House, and other parts of the steam yacht *Said*, for the Pasha of Egypt; Jessore Church, Bengal; the ground-floor of the new General Post-Office, Calcutta; and the Cathedral of the Spanish town, Jamaica.

LIFE AND DEATH.

The Registrar-General's annual report for 1858, referring first, not to England alone, but to Great Britain, states that its estimated population in the middle of 1858 was 22,626,334, and the excess of births over deaths in the year, 246,488. 759,676 children were born alive, 351,346 persons were married, and 513,188 died; so that, on an average, upon every day in the year, 2,080 children were born, 962 persons married, and 1,405 died, leaving a gain of 675 as the result of the day. The birth rate for Great Britain was 33·57 to 1,000 living, the death rate 22·68, the marriage rate (persons married) 15·52. For easy recollection it may be noted that rather more than twice as many are born in a year as are married, and the deaths should not be so high as midway between those two numbers. To 1,000 people living in the two countries the births in the year were thirty-four in Great Britain, twenty-seven in France—a very striking difference; the deaths twenty-three in Great Britain, twenty-four in France; the persons married 15·5 in Great Britain, 16·9 in France. In Scotland the marriages, if all registered, were not so numerous as in England; the births were almost exactly at the same rate; but the percentage of deaths in Scotland was only 2·047, in England 2·303. Turning now to England and Wales only, we learn that to every 1,000 girls 1,045 boys were born, and 102 males died to every 100 females, the average of twenty-one years being 103; but there are more females living in England than males, and out of equal numbers living 105 males died to every 100 females, the average being 107. The births are always most numerous in the first half of the year: in 1858 they were as 2,091 to 1,909 in the two half-years. The mortality of the year was high. The deaths in the chief towns were at the rate of 2·655; in the country districts, 2·006. The deaths registered in the three months that ended the 30th June, were 110,878,—a larger number than was returned in any previous June quarter (1848-59). The annual rate of mortality last quarter was 2·228 per cent. of the population, while the average of ten previous springs was 2·195. It is a remarkable and interesting fact that, if 2,000,000 of acres on which the chief towns of England are situated be distinguished from the remaining 35,000,000 which hold small towns and country parishes, it is found that the rate of mortality on the former (2·305 per cent. per annum) was *below* the average of last quarter, whereas on the latter the rate, 2·155, was *above* the average. The average rates were respectively, 2·346 and 2·028. It cannot be questioned that large populations have even now some advantages of a nature favourable to health which villages do not possess. The highest attainable health is probably to be sought in a happy combination of both states—*rus in urbe*. In London 14,894 persons died in the quarter. The metropolis lost about a thousand more lives than in the healthier spring of 1859. Pulmonary complaints were very fatal. The mortality from zymotic diseases generally was comparatively low: in this class measles chiefly prevailed.

DRINKING-FOUNTAIN COMPETITION, BOSTON.

Twenty-two designs were submitted in competition for the above, when that by Mr. Sherwin, of Liverpool, obtained the first place, and that by Mr. Charles Phipps, of Bath, the second. Both are Gothic designs.

HEREFORD CLOCK TOWER COMPETITION.

The Hereford Town Council advertised for designs for a Clock Tower and Clock-Tower Entrance. Fifty-eight architects have sent in designs, and these are now being exhibited in the Shire-hall. The decision is to be announced on the 6th of next month.

SOUTHMOLTON MARKET COMPETITION.

The first prize of 25*l.* was awarded to Mr. W. T. Cross, of Exeter; and the second prize to Messrs. Waters, of London and Exeter. Mr. Cross was appointed architect for the erection of the new market, at an estimated cost of 3,000*l.*

SCULPTURE AND GOTHIC ARCHITECTURE.

At the *conversazione* of the Birmingham Archæological Association, held in King Edward VI.'s School-room, on the 7th inst., Mr. Chamberlain read a paper on this subject. He said that in the old Gothic times, sculpture and sculptured decoration were of many different kinds, sometimes simple and cheap, sometimes elaborate and costly, now conventional and then natural, now roughly hewn and then smoothly finished, as circumstances might dictate; but that in all good Gothic work sculptured decoration of some kind was present, and that in the best periods it was used most profusely and lavishly. In the minor works of the period as much was given as the builders could afford; but, in the cathedrals and other large works, every feature, external or internal, was wrought by the agency of the chisel and mallet into forms of great and lasting beauty. Although many styles had used sculpture profusely, in no other than the Gothic had it been trusted to so wholly or relied upon so thoroughly. It had commenced with perfectly simple forms and conventional methods of treatment, and had worked its way up to the expression of the natural grace and beauty of leaves and flowers, of the human form in the added majesty of clothing, and the human countenance. The artists who produced this sculpture also knew thoroughly well where it should be placed, and where it would show to the greatest advantage, so that by this means also this work possessed a

charm which modern work frequently is wanting in. Their practice was not to put a public building at one end of a street and a statue at another, but they made their public buildings eloquent with the statues of the saint, the warrior, and the statesman, and thus secured to each part the dignity and the excellence of fellowship. All Gothic sculpture commenced in the decoration of the constructional features of the building, and forms which, by superficial observers, are supposed to be merely ornamental, are full of actual use and real service. The law of Gothic life was, first, truth and use; and then beauty. All that the architect needed in the way of size or of strength, every feature of construction required by his building, was provided first and chief of all; but he did not end his labour there, but by his thoughtfulness and care these necessities of construction were made, each in its degree, beautiful; and, while the usefulness of the building was unhindered and its strength undiminished, the required beauty was obtained, to the building's great and lasting glory. The Gothic architects allowed the workmen an amount of liberty which was never tolerated in the Classic styles: both the Greek and the Gothic builders knew that only one man here and there was compelled to produce the best work, but that there were a host of men who could produce the minor forms of decoration. The Gothic architect eagerly accepted their help: he asked each man to produce the best work possible to him; and only reserved to himself the right of deciding where it should be placed. The Greek architect, on the other hand, brought down his own ideas to what he conceived as the level of average ability. He set before the workmen some few abstract forms, some few simple arrangements of conventional line, and compelled them to produce these low forms of beauty with mechanical perfectness, no deviation being permitted from the decreed standard. The law of the Greek was copyism and unholy obedience. The law of the Mediævalist was liberty and law. Consequently, in the best Gothic work the grand spectacle was exhibited of many differing minds, and much varying power, all working harmoniously together, to produce a given and worthy end. Every building became a book, stored with all kinds of lore for all degrees of men; full of all sorts of truths and lessons; written ever with the records of noble and heroic deeds; and eloquent with the great truths of Scripture history. Those who decry this style have found fault with it as being barbarous; but they would see less to blame if they considered the matter more deeply. One part of the grotesqueness was attributable to the state of general education of the people: these buildings were meant to be understood by them, and the grotesque sculpture was exactly fitted to awaken their inquiries and to cause them to think for themselves. One other great part was attributable to the fact that the spirit of the style encouraged rough village masons and carpenters to attempt methods of ornamentation above the mechanical powers of production which they had acquired, but that, however rough and rude their efforts might be, it was better that they thought about leaves and flowers, about saints and angels, than if they had contented themselves, as in the modern classic days, with cutting triglyphs and sinking square channels round stones. The spirit of Gothic architecture always remained the same: the outward characteristics of the style changed rightly with each century. The Middle Ages were the days of Ecclesiastical architecture. This was the period of Domestic architecture. Yet in this, as in the old styles, sculpture ought to form a chief method of decoration. The union of architecture and sculpture was again needed: each was feeble and weak without the other; and true architecture and good sculpture were alike impossible, until the architect and sculptor were really one, and their work recognized as being in all essentials the same. The revival of Gothic architecture became every day more sure in its success, but it still needed the earnest and hearty co-operation of all who love art. Those who oppose hardly seem to know what they are doing: they are opposing a style in which progress is possible, and success is sure—a style which can use all the powers of man, which can find room for the most humble work, and which thankfully receives the highest; while the style which they would propose in its stead was weighed long ago in the balance and found wanting,—a style where success means degradation, and whose prosperity entails upon its followers that worst of all servitude—the slavery of the will and the mind.

At the same meeting Sir Francis Scott made some observations on Limoges enamels (of which specimens were exhibited); and Mr. T. Bunce read a paper, entitled "A Few Words about Antiquaries."

LEEDS SCHOOL OF ART.

A GREAT effort is now being made to raise funds for a new school of art in Leeds. It is to form one wing of the projected Mechanics' Institution, concerning which an advertisement to architects for plans recently appeared in our columns. Perhaps, in proportion to the size of the town, Leeds may at present be said to have the worst accommodation for a school of art of any town in England. Lord Palmerston has consented to preside at a meeting in October, at Leeds, to inaugurate the building scheme of the whole institution, and to bring its claims forcibly before the public. He will also be requested to distribute the medals to the successful students at the school of art. It is proposed to build the school of art wing first.

The increase of work in the latter shows how peremptorily additional accommodation is called for. We quote from the list of successful candidates at the late examination:—

Summary and Comparison of Results for Session ending 15th June, 1860.

	1859.	1860.
Number of medals awarded.....	11	20
Passed senior examination	53	103
Passed junior examination	73	150
Elementary prizes	75	92

THE PUBLIC BATHS AND WASH-HOUSES OF THE METROPOLIS.

THIS movement progresses in a most satisfactory manner, and the accommodation provided in these places is appreciated by the class for which they were intended. In connection with some of the large swimming-baths, clubs have been formed, and skilful professors teach the useful art of swimming. This is a matter which has for long been too much neglected in the large towns of England, a fact which seems remarkable, when we consider how eminent this nation is as a maritime one.

From inquiries made, it seems that the number of bathers is constantly increasing. In this respect we are, however, only going back to a good practice of days gone by,—to the old Roman and Saxon times of England,—when the use of the bath was common. The wholesome custom, in the Mediæval and more recent ages, went nearly out of use.

Buckland, in his "Curiosities of Natural History," remarks that the English people have not been for so very long a bathing people, so that bathing-machines on the sea-shore are a comparatively recent invention. The sea was only considered fit for the purposes of commerce, and the coast as the residence of merchants and fishermen.

Bath, and some other places famous for mineral waters, were in use. More than a hundred years ago a physician named Russell wrote a book on the advantages of washing his body in the sea. From that time the pleasant nooks along the British coast have been becoming more and more in request. Brighton has risen to a vast population, and places which were formerly desert spots are now yearly resorted to by thousands for health and pleasure.

THE VICTORIAN TRADES' HALL AND LITERARY INSTITUTE, MELBOURNE.

AN inaugural address, for 1860, was delivered by Mr. John Millar, Honorary Architect to the Institute, on 24th May last, on the presentation of a design by him, gratis, for a permanent hall, to be erected on the Government gift of an acre of ground in the centre of the city for a site, and estimated to be worth 10,000*l*. The extreme measurements of the building will be 340 feet by 135 feet. The site is 400 by 250 feet, bounded on one side by Victoria-street, and on the other by Lygon-street. The building will be placed in the centre of the ground, isolated, and elevated upon a stylobate of 7½ feet above the level of the street, and approached from both fronts by deep flights of steps of 40 feet each in extent. The style will be Greek of the Periclean age, the Greek being regarded by the architect as more appropriate to the climate than Old English, which he should have otherwise, he says, preferred. The great central public hall of the edifice will be capable of accommodating 4,500 persons, and measures 150 feet by 90 feet wide, and 75 feet in height, including the galleries. Various committee-rooms for the separate trades surround the hall, and there will be a colonnade 130 feet by 20 feet, running parallel with these and the central hall. There will also be a lecture hall, 80 feet in diameter, class-rooms, news-room, and various other accommodation, besides a basement story for stores, &c. The portico is flanked by a campanile tower, 80 feet in height. Nothing is said of the probable or estimated cost. In his address, Mr. Millar particularized the following as a few of the buildings in progress of erection at Melbourne:—

Senate House.....	at a cost of	£250,000
Post Office	,,	100,000
Custom House	,,	100,000
Treasury.....	,,	100,000
Chief Secretary's Office	,,	150,000
Free Public Library	,,	200,000
University	,,	100,000

all connected with the State; besides the numerous banking establishments, including the Savings Bank, and many others, at a cost, he says, far exceeding a million of money.

BATTLE-FIELD CHURCH, NEAR SHREWSBURY.

THE attention of the public having been directed to this interesting relic of past days, by the visit of the archæological congress to the spot, let us hope some advantage will follow.

Here, where Sir John Falstaff fought a whole hour by Shrewsbury clock—if he might be believed,—this church was erected in memory of the dead who fell in a great national struggle. The building, moreover, is a very good example of a certain style of English architecture. This ancient church—in every way so interesting—has been allowed to fall into decay, as we some time since stated: a large portion of the roof is gone; and, if efforts are not made, the place will become a complete ruin. The population of this parish is very small, and the means available quite insufficient for the restoration of the building.

Some time since it was said that the owner of the domain on which stands the church, being friendly to English sports,—hunting, and others,—it was proposed in his honour to restore it: it seems, however, that a present of plate or something of the kind was accepted instead. The gentlemen of Shropshire are generally remarkable for both patriotism and intelligence; and it may be hoped, therefore, that Battle-field Church will not be allowed to perish.

SURVEYORS AND THE APPRAISERS' LICENSE.

WE were requested last week to publish the following correspondence, but preferred making some inquiry first:—

Sir,—I have to acknowledge the receipt of your favour of 21st instant, and beg to thank the Board for their courtesy.

You say "Every person who exercises the calling or occupation of an appraiser, and who, for or in expectation of any gain, fee, or reward, makes any appraisement, or valuation chargeable by law with any stamp duty, requires a license," &c.

Permit me to trespass a little further, in order that I may be informed what is an appraisement or valuation chargeable by law with any stamp duty. I have applied to my legal adviser, who is unable to inform me; and as I am desirous of fully complying with all proper legal requisitions, I should feel greatly obliged by a definite explanation of the terms employed.

For example: If I, in the course of my professional practice, prepare a valuation, that is, a report of my opinion of the value of any property for sale, mortgage, or probate, is a document of that kind liable to stamp duty? If, under ordinary practice, such a document is exempt from duty, but when used in the Court of Chancery, for example, requires by the rules to be stamped subsequently to leaving my hands, ought I to be licensed before making an affidavit on plain paper, for the purpose of having my report so used?

Again: If, in my profession of an architect, I measure and value the materials and workmanship in any building, for the purpose of adjusting the settlement between the proprietor and the builder, ought I to take out a license before acting in that capacity—the documents in ordinary cases never being stamped at all? I am not aware that any court would require such documents to be stamped.

And again: If in a dispute between certain parties I am appointed a referee for the adjustment of their differences by a proper legal instrument, and in that capacity measure and value any artificer's work and material, or value any land or building, making my award upon a proper legal instrument, is it necessary that I should be licensed before acting in that capacity?

Hoping to be favoured with a reply to the foregoing inquiries, I remain, &c.

"Inland Revenue, Somerset House, London, W.C.
1st August, 1860.

Sir,—Referring to your further letter of the 23rd ult., I am directed to inform you that all appraisement or valuation of any estate or effects, real or personal, heritable or movable, or of any interest therein, or of the annual value thereof, or of any dilapidations or of any repairs wanted, or of the materials and labour used or to be used in any buildings, or of any artificers' work whatsoever, is liable to duty.

I have also to state that an appraiser is liable to a

penalty of 50*l.* if he neglects to deliver to his employer, within fourteen days, a duly stamped appraisement.—I am, sir, your obedient servant,

(Signed) T. Sarjent."

It was held, at the Inland Revenue Office a few years ago, and correctly as it seems to us, that a license is not necessary for those who, acting for the builder, prepare his accounts. These are not "appraisements" requiring a stamp, but the tradesman's bills of charges, and the surveyor is simply his clerk for the time, so to speak.

A STATUE OF ROBERT STEPHENSON.

A meeting of noblemen and gentlemen, friends of the late Mr. Robert Stephenson, M.P., was recently held at Fendall's Hotel, Westminster, for the purpose of taking into consideration the most appropriate mode of testifying, in a public manner, the general respect for his memory. Lord Llanover was unanimously requested to take the chair. In the course of his address the chairman said he would suggest the memorial being a statue, and that application should be made to the Government for permission to place it within the area of St. Margaret's Gardens, Westminster, where, beside that of Brunel, on the way between the scenes of their professional labours, and of the parliamentary contests they had maintained, the effigies of the two men might stand as beacons of encouragement to the younger members of that profession to which great Britain owed so much of her present greatness and prosperity. Mr. Joseph Locke, M.P., proposed the first resolution, which was seconded by Lord Powis. Mr. Hawkshaw proposed the second resolution, seconded by Mr. Fowler; and the third resolution was moved by Mr. J. P. Gassiot, and seconded by the Hon. Robert Grimstone. The resolutions were then unanimously passed: they are as follows:—"1st. That this meeting, desiring to testify the universal respect entertained for the character of the late Mr. Robert Stephenson, M.P., proposes to erect a statue to his memory. 2nd. That subscription lists be opened for providing the necessary funds. 3rd. That the noblemen and gentlemen present be requested to act as a committee for carrying into effect the foregoing resolutions, with power to add to their number." Subscription-lists were ordered to be opened at the banks of Messrs. Glyn, Mills, & Co., and Messrs. Coutts and Co., London; and Messrs. Hodgkin, Barcett, Pease, & Spence, Newcastle-upon-Tyne; and at the office of Mr. J. G. Parry and Mr. Charles Manby, the honorary secretaries, 24, Great George-street, Westminster.

THE DRINKING-FOUNTAIN MOVEMENT.

A fountain of some cost has been erected by Messrs. Wills, Brothers, in the Strand, close to the church of St. Mary-le-Strand, and nearly opposite Somerset House. The public are indebted for it to the liberality of Mr. Robert Hanbury, M.P. The base of the fountain is composed of polished red granite, above which there are six bronzed pillars supporting a polished marble entablature, surmounted by a dome enriched with water plants, and over all a Cupid without wings or darts, bearing on his head a vase supposed to contain that fluid which the fountain is intended to supply. There is, or is to be, a lamp suspended from the dome. The water flows from two jets out of a bronzed vase in the centre of the fountain. On the east end of the fountain is inscribed:—"The gift of R. Hanbury, esq., M.P.;" and underneath, and elsewhere are various texts. We are forced to say that the details are very unsatisfactory.

SUPPLY TO DRINKING-FOUNTAINS.

Respecting the filters in street drinking-fountains, your correspondent justly points out the need of change or the necessity for improvements therein. I have, through practical experience whilst fitting up filters, for a considerable time past also felt convinced of the need of a change, and would therefore suggest the following remedy. In all the drinking-fountains which I have taken notice of, the following plan is carried out:—the water supplied by the company is first introduced to the filter, and, after passing through the best filtering substance or purifying process known, is immediately allowed to flow onward through several feet of metal pipe, pass brass taps, empty into metal cisterns with copper ball-cock, then descend through smaller pipes, and is given out to the people warm in summer time, and generally impure.

I would suggest that in no case whatever should filtered water be allowed to come in contact with metal afterwards. There is no necessity; for, when the water has once passed through a filter, it should flow on through glass tubes, earthenware pipes, or enamelled iron bore to the outlet. Such tube or pipe may be protected by passing through a pipe of larger diameter, or in some cases through solid stone, or even through the middle of an ice-box, and thus effectually escape the heat of the sun. But if the filter is fixed in the proper place, which is as near as possible to the outlet, the water will be generally obtained, independently of other means, both pure and cold.

The expense of altering or removing the filters now in use or action would be trifling; and in those hereafter erected the cost would be much less than heretofore. The space required would be less also.

The friends and admirers of this drinking-fountain movement are greatly indebted for the information and suggestions given in the columns of the *Builder*.

William Fast.

THE SIZE OF RAIN-WATER PIPES.

The formula $400\ a\ \sqrt{h}$ = discharge in cubic feet per minute, used by some writers, when applied to rain-water pipes leads to very erroneous results, being based upon the assumption that fluids follow nearly the same laws of gravity as solid bodies, which is true only so far as relates to velocity.

When the fluid falls in a continuous stream, the velocity multiplied by the sectional area of the column will be a constant quantity for all heights, the size of the stream diminishing as the velocity increases.

It therefore follows that the length of a rain-water pipe will not affect the discharge to any extent.

In calculating the following table, I have adopted the formula $q = 5\ \sqrt{d^5}$; d representing the diameter of the pipe in decimals of a foot, and q the quantity of water discharged in cubic feet per second.

It is applicable to all vertical pipes which receive their supply with little or no pressure or head.

Table showing the Discharge from vertical Rain-water Pipes, &c.

Diam. of stack pipe in inches.	Discharge in cubic feet per second.	Discharge in cubic feet per minute.	Superficial feet of roof-age water discharged by pipe, the rainfall being at the rate of 1 inch per hour.	Diameter of pipe required to lead the water from foot of stack pipe. Fall—1 in 240
2	·057	3·402	2,449	3 inches.
2½	·099	5·943	4,279	4 ,,
3	·156	9·375	6,750	4 ,,
3½	·230	13·783	9,924	6 ,,
4	·321	19·250	13,860	6 ,,
4½	·431	25·834	18,600	6 ,,
5	·560	33·620	24,206	9 ,,
5½	·711	42·665	30,719	9 ,,
6	·884	53·033	38,184	9 ,,

It will be seen from this table that, even in small pipes so placed, the capacity for discharging water is very considerable.

The stack pipes generally used are abundantly large, but the eaves gutters are frequently too small.

Eaves gutters should never be less in width or depth than twice the diameter of the stack pipe: the depth, however, should be reduced towards the end farthest from the pipe, so as to admit of a sufficient fall, the appearance presented by which might be concealed by having a fascia of uniform width cast on the face of the gutter.

J. T. Hurst.

THE FIRST MAKER OF EARTHENWARE SEWER AND DRAIN PIPES.

In a recent number of your journal, under the above head, are some inquiries as to the comparative novelty in this country of earthenware socket-pipes. I beg to call your correspondent's attention to the following extracts from Heath's "Accounts of the Ancient and Present State of Ragland Castle, &c. Monmouth, 1806."

"The well which supplied Ragland Castle with water . . . . is distant near two miles, ... many of the pipes which conveyed it have been ploughed up in the fields in which they were laid. . . . . These pipes were of two sorts, viz., lead and earthenware. Mr. Daniel was so obliging as to favour me with a piece of this pipe, which is made of clay, but so well and judiciously burnt, that, though it has been underground some centuries, it would still defy the injuries of time and weather for ages to come. Judging from the part in my possession, they appear to have been made with *bell mouths*, and fixed one within the other. It measures ten inches in circumference, the diameter of the bore two inches, which would throw about 200 gallons of water per minute."

A patent was granted so early as 1619, for the manufacture of earthenware drain-pipes. See the "Abridgments of Specifications of Patents for Drain Tiles and Pipes," published by the Commissioners of Patents.

W. G. A.

A PROTEST AGAINST THE RIDE IN KENSINGTON GARDENS.

Mr. Editor,—*Do* hold out a helping hand to the nearly vanquished pedestrians who feel themselves failing in their hard struggle to maintain the integrity of their dearly-loved Kensington-gardens.

We do *not* wish, as has been asserted, to render the gardens "private," but merely to keep them *safe*; and every one knows it is positively *unsafe* for women and children to cross Rotten-row, during the hours chosen by equestrians for their rides. If the same is to be the case in Kensington-gardens, a large portion of the community must give up walking in them altogether, for they can neither go to nor return from any part of the gardens through two-thirds of the entrances without crossing the proposed ride, and thus running the risk of being ridden over by "a cavalcade of pretty women bounding along in their" breezy gallop.

As the writer of the *Times's* leading article is so very philanthropic, how was it the idea did not occur to him that less wealthy persons, who can only afford to ride in cabs and omnibuses, might also like to take an airing in the park and gardens? *They* have to bow in submission to a restriction which is made for the good of the many: so surely the rich equestrians, who have so numerous other enjoyments, may well afford to be bound by the same law.

Kensington-gardens is the only place in all London set apart for the use of pedestrians, while every park is open for riding and driving. Surely the suggestion to take it savours somewhat strongly of the old Hebrew story of the "one little ewe lamb."

If the equestrians wanted "turf" to gallop on, why did not they petition to have the sward preserved when slice after slice of grass land was taken away from the once broad stretches of green to widen their own Rotten-row? And if it be "shade" they need, will not the trees still left standing on the monopolised space suffice for that purpose, especially this very sunless summer, when to feel the heat of the god of day is a treat rather than a trial?

No: there is no good reason of justice or necessity why the beautiful gardens should be thus disfigured and rendered useless to those for whom they have been heretofore set apart, or no English Pater- or Mater-familias would raise a voice against the appropriation.—I remain, sir, respectfully yours,

The Mother of Three Little Girls
(Who certainly *do* like to be able to walk in Kensington-gardens twice in the day).

TREATMENT OF BUILDERS.

Sir,—In my neighbourhood it is proposed to erect national schools, with residence. Several builders of respectability were invited to send in tenders for the work, and met to receive instructions and hear conditions, by appointment, in the architect's office. It was there stated that *the lowest tender would be accepted*; but should its amount exceed the sum intended to be expended by the committee, *then* reductions would be made, which would be a matter of arrangement between the successful candidate and the architect.

When the tenders were examined (which, though considerably over 900*l.*, did not vary more than 30*l.*), it was found that the lowest considerably exceeded the sum proposed to be laid out; and slight alterations were made in the plans, for which a corresponding reduction was offered on behalf of the contractor whose estimate was the lowest. However, to the surprise of many, the committee (doubtless, from the advice of their architect) have decided on carrying out the works themselves, their professional adviser acting as builder, purchasing materials, and hiring labour.

Would you, sir, kindly offer an opinion as to the legality of such proceedings? Would you also be good enough to say whether such an arrangement as I have described is just to the competing builders, especially to him who sent in the lowest tender. Would he not be fairly entitled to compensation?

I confess myself ignorant of the civil law in this matter, but I am quite sure that "*Summum jus summa injuria.*"

A Country Builder.

*** Just, of course, it is not. If the statement in the letter can be proved, and there were no contrary "condition," the builder who made the lowest tender is in a position to sue for compensation.

INSTITUTION OF MECHANICAL ENGINEERS.

The proceedings in connection with the annual provincial meeting of this Institution commenced on Wednesday, the 8th August, in the Lecture Theatre of the Midland Institute, at Birmingham. Mr. James Fenton, of the Low Moor Iron Works, near Bradford, Yorkshire, presided, and there was a numerous attendance, principally gentlemen resident in Birmingham. The walls of the room, and around the platform, were hung with diagrams illustrating the subjects treated in the papers read.

The Chairman having briefly opened the meeting, called upon Mr. William Mathews, of Corbyn's Hall Iron Works, Dudley, to read the first paper mentioned in the programme. Mr. Mathews then proceeded with his paper, which was "On the Ten-yard Coal of South Staffordshire, and the Mode of Working." The remaining papers were read by Mr. Marshall (secretary). The first was by Mr. Charles Cochrane, of Middlesbrough, describing a method for taking off the waste gases from blast furnaces.

The next was by Mr. E. W. Siemens, of London, on a new method of insulating electric wires for submarine and underground purposes, by the application of india-rubber and its compounds. Mr. Siemens remarked that until lately gutta-percha was thought

to be an almost perfect non-conductor of electricity, but in dealing with long lines of submarine electric telegraph, its conductivity had become a source of painful anxiety to the electrical engineer, who had to look about for other insulating materials. Glass and other vitreous substances, which possessed the higher insulating properties, were, of course, inapplicable; and, amongst the various insulators, none combined the insulating quality, with flexibility, and other desirable properties, in so high degree as india-rubber and its compounds. The proposal of Mr. Siemens was based on the well-known adherent property of india-rubber when two freshly-cut surfaces were joined under considerable pressure. It was stated that the advantage of comparative cheapness, and certainty of result, would by this system be combined with that of rendering the application of heat unnecessary. A practical demonstration of the proposed method was given by means of a working model.

The fourth paper read was "On Coal-burning in Locomotive Engines," by Mr. Charles Markham, of Derby. Mr. Markham stated that experiments on the Midland lines had resulted in a simple apparatus termed "a smoke consumption plate," with which all the engines on the above line were now fitted, and by means of which the smoke was burnt with a completeness and efficiency that had never been previously attained. The Chairman stated that Mr. Markham's invention saved the Midland Railway Company 40,000*l.* per annum.

On Thursday, the proceedings were resumed, Mr. James Kennedy, of Liverpool, president of the Institution, in the chair. The attendance was as numerous as on the preceding day.

The first paper, read by Mr. Marshall (secretary), was a description of Aert's Water Axle Box, by Mr. Sampson Lloyd, of Wednesbury.

The second was on a new system of Open Coking, by Mr. S. H. Blackwell, of Dudley.

The next was a "Description of a Machine for Drilling instead of Punching Wrought-iron Plate," by Mr. John Cochrane, of Woodside Ironworks, Dudley. The machine was designed for the purpose of drilling a large number of holes in wrought-iron plates required for the construction of girders for the new railway bridge over the Thames, at Hungerford. In describing the machine, it was stated that the plate to be drilled by it was placed on a table, and surrounded by a wrought-iron frame, within which the plate was accurately adjusted to the proper position: water-pressure was employed for raising the table to the drills, and for giving the required working pressure in drilling. The machine was arranged so as to drill all the holes in one plate simultaneously, and accomplished its work with much rapidity, and complete efficiency.

The next paper was a "Description of the Round Oak Ironworks," by Mr. Frederick Smith, of Brierly Hill, communicated through Mr. Alexander B. Cochrane, of Dudley.

The fifth was "On the Application of the Decimal System of Measurement in Boring and Turning," &c., by Mr. John Fernie, of Derby.

The last paper was a "Description of Machinery for Crushing Stone for Macadamising Roads," by Mr. Charles G. Mountain, of Birmingham. The writer stated that he believed the machine referred to in the paper was the only instance in which the invention had been found commercially successful. Its origin was due to Messrs. Ellis & Everard, of Leicester, who desired a machine to break stones which would otherwise have been wasted in the March-field quarries, near Ashby, in Leicestershire. The design was prepared by Messrs. Ellis & Everard, and placed in the hands of Mr. J. E. Hodgkin, Birmingham, to construct a machine, but Mr. Hodgkin relinquishing business, it devolved upon the writer to carry it into effect. The experiments made with the machine completely established its success.

During Wednesday and Thursday afternoon a large number of the members of the institution availed themselves of the courteous invitation given them to visit the principal manufactories in the town, and from an inspection of which they derived much gratification.

The *conversazione* which took place in the Town-hall, on Wednesday evening, was attended by a large number of persons, including many ladies. In the committee-room was arranged an ample supply of refreshments, and in the hall adjoining there was an exhibition illustrative of art, science, and manufactures, the objects being principally supplied by local firms.

Books Received.

The Illustrated Horse-Doctor. By Edward Mayhew, M.R.C.V.S. London: Allen & Co., 7, Leadenhall-street. 1860.

This is a handsome and ably written volume on a subject of unquestionable importance to all classes, from the highest to the lowest, in the possession or the management of horses, and to building tradespeople fully as much as to any other. It is plainly written, without the use of much technical or veterinary phraseology, which, indeed, has been systematically avoided, in order that the book might become generally useful. It gives a detailed account, illustrated by more than 400 very graphic and interesting pictorial representations, by the author himself, of the various diseases to which that poor, faithful, and useful servant of man, the horse, is subject; together with an account of the latest mode of treatment, and the requisite prescriptions, written in plain English; so that, in fact, by its means, if judiciously perused, every one may become his own veterinary physician and surgeon, and be able to ward off and prevent many diseases, the premonitory symptoms of which ignorance and harsh usage but too often aggravate and confirm.

There are one or two points, however, on which we would have wished the author to have enlarged a little more than he has done; namely, on the proper construction and the sanitary arrangement of stables,—a subject to which we have frequently given attention, although the author asks, sarcastically, "How could any architect be so very 'maudlin' as to design a stable with the slightest consideration for a horse?" As well might we retort the sneer, since the author himself has done little or nothing to point the way to that proper construction for the want of which he blames "architects," who have but too seldom anything to do with it. Neither has he said anything worth speaking of in regard to the sanitary arrangements of stables, and shows want of appreciation of efforts in that direction while talking of the "great fuss made about sanitary laws" for human beings. Now although Mr. Mayhew is not an architect, surely he is a sanitary officer so far as regards stables and horses, and ought to have discussed the subject of sanitary arrangements, which in truth involves the more architectural department of construction itself. This defect in his otherwise very useful work we hope he will amend in an early one of those many new editions through which it will probably run.

Miscellanea.

Flues for Boilers.—In the course of the last report of Mr. H. W. Harman, C.E., chief inspector to the Manchester Association for the Prevention of Boiler Explosions, he says,—"The necessity of strengthening all boiler flues, by encircling them with hoops of angle or T iron, seems at last to be more generally recognized. Any plan, however, by which the tendency of flues to collapse can be effectually guarded against should be hailed with satisfaction, as rendering explosions of less frequent occurrence, and demanding but periodical and proper inspection to ensure entire safety."

Patent Chimney-Bar and Hearth-Plate.—The chimney-bar and ventilating hearth-plate, recently patented by Messrs. Edwards & Co., deserve attention. By the introduction of the patent chimney-bar, the flue is at once formed of the required size, 14 inches by 9 inches, thus doing away with the large open space left when the old chimney-bar is used, and which has so often been found not only unnecessary but very objectionable. A register-door is attached to the chimney-bar, arranged so that no space is left for the accumulation of soot or dust. By the ventilating hearth-plate the supply of fresh external air may be brought to the box either between the joists or through hollow bricks, and enter the room through a sliding ventilator in hearth-plate, as shown on plan, and which would be underneath the bottom plate of fender. The expense of the proposed arrangements is comparatively trifling.

Boydell's Traction Engine in Brazil.—The traction engine, which was manufactured under Boydell's Patent, by Messrs. E. T. Bellhouse & Co., engineers, of Manchester, has arrived in Brazil, and is the first steam locomotive in the empire which has ascended to the height of 3,000 feet above the sea. The ascent from the Maua Railway to the city of Petropolis, 3,000 feet in a distance of eight miles, was achieved successfully, we are informed, and the very sharp curves were easily turned. The natives were considerably astonished at its progress and arrival at the city, and seem now prepared to believe any strange tale told by Englishmen, although many doubt the evidence of their own eyes that the engine is in Petropolis. This is the first traction engine which has been sent to Brazil, and it is likely that others will follow, the keep of animals being very costly.

Builders' Contracts.—At the Nottingham Bankruptcy Court, a few days back, some curious disclosures were made in reference to builders' contracts. A bankrupt explained an ingenious system thus:—Suppose eight or nine builders are invited to tender for a job: they meet together, and agree to put so much money, perhaps 200*l.*, on the contracts, which are then sent in in the ordinary way. Whoever is the successful competitor gives a bill for the sum put on, and it is divided among the other builders for their trouble in estimating. The Commissioner said: It strikes me as being a kind of fraud upon the parties who invite the tenders.—Mr. Danks: It is done merely to recompense the unsuccessful contractors for their trouble.—His Honour: They get 200*l.* divided among them, and, as that is put on the estimates, they are to that extent fictitious. The successful one is often enabled to put in a contract which would not have been accepted if the other contracts had been properly estimated. If this is a custom, I think it is more highly honoured in the breach than in the observance.—*Worcester Chronicle.*

The Harrow Tontine Association.—We see that a Tontine Association has been established to effect the building of first-class houses, much needed at Harrow. In this Association all the advantages of the system appear to be secured to the shareholders themselves, as the houses to be erected with the capital subscribed become the property of those holding a nomination on the lives of the last survivors when such lives drop to the number of the houses built, the profit rents, until that period, being divided amongst the shareholders.

Masters and Operatives Bill.—The select committee of the House of Lords on this Bill have made a report, to the effect that they cannot come to any satisfactory conclusion with reference to the Bill before them without giving to the manufacturing and commercial interests which have not yet been heard an opportunity of stating their opinions respecting it; they therefore recommend that the subject should be postponed until next session.

Craven Hotel, Strand.—In these times of hotel-building by companies, through whom it may be hoped London before long will be well supplied in this particular, it is but fair to mention what is being done by private owners. Mr. Tapster has enlarged and nearly rebuilt the Craven Hotel, Craven-street, Strand, under the guidance of Messrs. Banks and Barry, and has effected a very great improvement. A lofty coffee-room, of considerable pretensions, has been formed, and the general arrangements for the accommodation of the public appear to be very satisfactory. Messrs. Lucas, Brothers, have executed the works.

Value of Landed Property.—The Berkswell Hall estate, Warwickshire, ten miles from Leamington, in a favourite sporting country, was submitted to public auction at the Mart, on Wednesday, by Messrs. Chinnock & Galsworthy. The sale attracted a large attendance of gentlemen from the Midland counties, many of them accompanied by their agents, and evidently intent upon purchasing this fine estate. The rental, as stated in the particulars, was 2,350*l.*, including the cottages and 250*l.* fixed as the estimated rental of the mansion. The biddings commenced at 60,000*l.*, and after a spirited competition the price reached 81,000*l.*, at which it was knocked down to Mr. Thomas Walker, of Orgreaves Park, near Lichfield, thus realizing thirty-four and a half years' purchase on the total rental, with the addition of timber at a valuation.

The Ellesmere Memorial.—On the 10th inst. the ceremony of inaugurating the memorial tower erected to the memory of the late Earl of Ellesmere (and of which we have already given an engraved view in the *Builder*), took place at Worsley. Messrs. Driver & Webber, of London, were the architects. The monument, which stands on the west side of Worsley New Hall, is a tower of transition Gothic character, consisting of an octagon shaft, with spiral belt of coloured tiles, rising from a square basement, terminated by a corbelled out-gallery, with iron balustrade, around a central spirelet. The height of the tower is 132 feet, and from the top a view of the surrounding country can be obtained. At the inauguration, suitable addresses were made by the Rev. St. Vincent Beechey and Mr. Fereday Smith, which were responded to by the Earl of Ellesmere and Mr. Webber, the architect.

Lichfield Cathedral.—The restorations going forward in this cathedral have been the occasion of discoveries illustrating the ancient history of the fabric. Foundations of old walls have been uncovered, which appear to point to the fact that at least two distinct structures have occupied the site at different periods previous to the erection of the present cathedral. Nearly in the centre of the present choir the foundations of a church, with an apsidal termination some 27 feet in radius, are visible. Farther eastward are the foundations and part of the external plinth mouldings of a still larger building. A plan has been made by Dr. Rawson of all that has been found. Numerous other objects of interest have been discovered, such as Norman capitals and arch stones, old coffins, and encaustic tiles. The large spire of the cathedral was struck by lightning on the 29th ulto. It cracked the spire at the base just above the tower, removing a large piece of stone from the window frame: the stone went through the ceiling of the north-east aisle which is under repair. The congregation assembled in the south-west aisle, though much alarmed, sustained no injury. It is said that the spire will have to be taken down as low as the battlement, the top having been injured as well as the bottom.

Fall of a Building at Pendleton.—A serious accident occurred a few days ago at Pendleton, three persons being killed and several severely injured, by the fall of the larger portion of the premises occupied by Mr. John Parry, as a small-ware manufactory. The building was in Ford-lane, near the railway station. It was two stories high, and consisted of an old and new part, the latter having been erected within the last twelve months, by Mr. Thomas Valentine, builder, Pendleton. According to the *Manchester Guardian*, the new portion of the manufactory was 70 yards long, and there were fourteen or fifteen persons at work in it at the time of the accident. It seems that, without the slightest indication of danger having been noticed by any of the hands, the whole of this portion crumbled to the ground like a child's house of cards, and so complete was the destruction that scarcely two bricks were left standing together.

Crystal Palace.—The great annual excursion of the Foresters will be held at the Crystal Palace on Tuesday next, the 21st of August. Last year the enormous number of 63,181 persons attended this festival. The Great Summer Poultry Show, which always attracts large numbers of provincial visitors, takes place in the last week in August. This is to be followed on the 30th August by a special day set apart for amusements provided by Mr. Strange, the contractor for the refreshment department. On the 1st September the Hollyhock Show will be held. In the following week the Tonic Sol Fa Association hold a contest of singing societies, a party of Scotch vocalists coming expressly from Edinburgh to sing some of their national airs. On Thursday, the 13th September, the Licensed Victuallers hold a great festival for the benefit of their Asylum. A performance by about 2,000 voices of Mr. Martin's glees, which were so successfully produced at Exeter Hall last month, will take place on Saturday, 15th September; and on the 19th and 20th of the same month the Autumn Dahlia and Fruit Show: on two of the last days of September Madame Clara Novello, who is coming to England on her farewell tour, will sing for the last time in the "Creation" and "Messiah," two performances of which will be got up directed by Mr. Benedict.

The Charing-cross Railway.—At the second ordinary general meeting of the company, the report which was read stated that the works connected with the railway bridge across the Thames at Charing-cross were commenced in February last; and the progress already made has been considerable. The principal expenditure incurred has been on account of the purchase of the existing Charing-cross Suspension-bridge, and for the land and property at Hungerford-market, required for the terminus. The directors have concluded an arrangement with the Clifton Bridge Company to sell them the chains and materials of the bridge (exclusive of the piers) for 5,000*l.*, the purchasers removing them. Steps are forthwith to be taken for purchasing the further property required, in order that the works between the south end of the Charing-cross bridge and London-bridge station may be completed by the time that the railway-bridge and new West-end terminus are ready for traffic. The engineer's report stated that the contractors are making good progress with the Charing-cross bridge. The two cylinders which are to form the first pier on the Surrey side are already sunk to a considerable depth into the bed of the river. Considerable progress is also being made at the contractor's works with the superstructure. The iron necessary for two of the spans is in hand, and about fifty tons have been put together ready for erection. The receipts for the half-year ending June 30th, 1860, amounted to 122,231,12*l.*, and the expenditure to 58,626*l.* 2s., leaving a balance of 63,605*l.* 10s. 9d.

Builders' Dinners.—Sir: As another instance of masters assisting in promoting the social pleasures of their workmen and of good feeling in place of disagreements, I hope it will be worthy of your notice, that on Saturday, the 4th, the workmen in the employ of Dove, Brothers, builders, Islington, went for a holiday in vans to Epping Forest, where an excellent dinner and tea were partaken of. The chair was taken by Mr. Critchett, supported by Messrs. G. Dove, Combe, Stutely, Lett, Southam, connected with the firm. The health of our employers was drunk with enthusiasm, in acknowledgment of the very liberal donation given by them towards our enjoyment, and in the evening the party returned to Islington heartily satisfied with the day's pleasure. —One of the Party.

*** We have received similar notes as to other firms (Mr. Parsons', &c.), but cannot find room for more.

Normanton Church Competition.—Competitors, who have received back their designs as "unsuitable," desire to know whose design has been found suitable.

Mosaic Pavement.—We are asked to draw attention to a mosaic pavement, which has just been laid by the Architectural Pottery Company, Poole, Dorset, at their offices, 36, Parliament-street. The design is by Mr. J. M. Lockyer, architect.

Metropolitan Board of Works.—At a meeting of this Board held last week, Mr. Dethick's tender for underpinning the Ranelagh sewer for 2,926*l.* was, upon the engineer's report, accepted. The Board, upon the recommendation of the chief engineer, determined upon taking the contract for the Southern High-level Sewer through the Surrey Consumers' Gas Company out of the hands of the present contractor, the chief engineer and the Board not being satisfied with the manner in which the work was being done.

Destruction of a Railway Station by Fire. A serious conflagration has taken place at Paisley, resulting in the complete destruction of the goods shed, for the accommodation of the goods traffic, at the railway station, and of a number of vans and waggons filled with a variety of valuable merchandise, which had arrived chiefly from the south. The building was almost entirely of wood.

Transmission of Money by Telegraph.—The *Progres*, of Lyons, says that the administration of the telegraphic lines has now under consideration a project for affording the public the facility of transmitting sums of money by telegraphic despatch. What, by the way, has become of the English project? The extension of the Post-office order system, we suspect, extinguished it. In the absence of such a system in France, the telegraphic one may have a better chance of success.

"Steam Superseded:" New Motive Power. A correspondent of the *Siècle*, M. Victor Borie, whose name is well-known, writes to announce to the public that the application of dilated air to the working of machinery, as a substitute for steam, has been discovered by a working mechanic of the name of Leveque, living at 31, Rue Rousseau, who is said to be exhibiting a piece of machinery, moved solely by air, of four-horse power, and in a way so perfectly satisfactory that, according to M. Victor Borie, the days of the steam-engine are numbered.

The Victoria Station and Pimlico Railway.—The railway and bridge are now ready for public traffic, and the works of the Brighton Company's station are fast advancing towards completion. The Victoria station is about a quarter of a mile west of Buckingham Palace, on the site of the basin of the Grosvenor Canal, and covers 10¼ acres. This space is divided in the centre, half being appropriated to the Brighton Company, and half to the Chatham and Dover and the Great Western jointly, the mixed gauge having been laid on this portion of the station, and over the main line. The Brighton station covers 5¼ acres, having eight platforms of considerable length. The main line passes under the Belgrave-road, is enclosed by walls, and covered by a glass roof for about half a mile. This has been done to protect Mr. Cubitt's property from the noise; and, as a further precaution, vulcanized india rubber is placed between the rails and the longitudinal sleepers. The chief work on the line is the bridge over the Thames, which, including the land openings, extends 920 feet in length. The quantities of materials used in the construction of this bridge have been as follows:—197,800 cubic feet of timber, used temporarily in gantries and cofferdams, and 16,800 cubic feet in floors; 10,700 cubic feet of York landings; 4,050 cubic yards of concrete; 6,500 cubic yards of brickwork; 23,857 cubic feet of Portland roach stone; 57,205 cubic feet of Bramley Fall stone; 1,296 tons of wrought iron, and 225 tons of cast iron. The total cost of the bridge will be about 90,000*l.*, or 3*l.* per square foot. Its strength has been tested by locomotive and loaded trucks, weighing together 350 tons. The deflection on the centre of the two middle openings was one inch and one-fifth, and the greatest deflection on the two other openings was 0·94 of an inch. The load removed, the bridge resumed its original level. It is expected that the railway and station will be opened for public traffic some time during the present month.

TENDERS

For a house at North Bow, for Mr. W. H. Mace. Mr. James Tolley, architect. Quantities supplied:—

Reed	£897 0 0
Ayers & Co.	887 0 0
Ashby & Horner	886 0 0

For two houses, Brick-lane, Spitalfields. Mr. William Reddall, architect:—

Kebbell	£1,030 0 0
Forrest	926 0 0
Johnson	775 0 0
Green	760 0 0
Pritchard & Son	755 0 0
Case	747 0 0
Scott	743 0 0

For taking down and rebuilding front wall of White Lion public-house, and part of the *Shipping Gazette* Office, and other works in Talbot-court, Gracechurch-street, for Mr. William Mitchell. Mr. J. Farring, architect:—

James & Son	£315 0 0
Ramsay	287 0 0
Norriss (accepted)	280 0 0

For erecting villa on the Trafford estate, near Norwich. John Daymond Ellis, architect, Norwich:—

Long	£1,375 0 0
Munro & Foyson	1,355 10 0
Brooks	1,343 0 0
Lacey	1,329 10 0

For offices at the corner of Fenchurch-street and Rood-lane, for Messrs. E. & S. Edwards. Mr. Henry Dawson, architect. Quantities supplied by Mr. Richard Roberts:—

Lucas, Brothers	£11,798 0 0
Piper & Sons	11,448 0 0
W. Cubitt & Co.	11,426 0 0
Brass	11,384 0 0
Ashby & Horner	11,240 0 0
Browne & Robinson	11,080 0 0
Axford & Co.	10,887 0 0

For additions and alterations to house, 49, Wigmore-street. Mr. T. H. Northcroft, architect. Quantities given —

Harrison	£797 0 0
Knapp & Son	794 16 0
Sanders	788 0 0
Bennett	776 0 0
Hyde	612 0 0
Simpson	610 0 0

For house, 48, Wigmore-street. Mr. T. H. Northcroft, architect. Quantities given:—

Wilson	£550 0 0
Terry	550 0 0
Knapp & Son	547 0 0
Jameson	540 0 0
Simpson	463 0 0

For Friends' endowed schools, Reeth, Yorkshire. Mr. Peachey, architect:—

	For schools and fittings, master's residence, and boundary walls. £ s. d.	For schools and fittings and small cottage only. £ s. d.
Warren	2,101 14 1	1,531 17 2
Armitage	2,046 12 4	1,536 1 4
Bullock	1,958 0 0	*1,350 0 0
Kemp & Abdale	1,890 0 0	1,507 3 0
Elwin	1,886 16 9	1,507 3 0

* Accepted.

For executing the cleansing, watering, cartage-work, and scavengering of the town of Leamington, for the Local Board of Health. Mr. A. Morgan, C.E., surveyor:—

Names.	Section No. 1. Cleansing, per an.	Section No. 2. Watering, per an.	Section No. 3. Cartage-work, &c., probable amount per an.	Section No. 4. Scavengering, per an.
Ivery	£850	£500	£245 8 0	£300
Hart	960	464	261 7 11	408
Croft	690	700	186 12 1	350
Clark	750	450	236 1 3	400
Marriott, accepted.	800	350	239 17 7	350

TO CORRESPONDENTS.

Letters on Marble.—Sir: Will any of your multitudinous readers inform me of any preparation for colouring letters in marble, that will resist the influence of the atmosphere? I have been in many cemeteries in different parts of the kingdom, and very few instances can I see of the colouring remaining unimpaired. It being a universal complaint, a preparation that would remedy the evil is a desideratum.—H.

C. F.—D.—T. D.—W. H. W.—J. H.—J. P. P.—W. P.—E. R.—W. B T. & R. B.—W. P. B. (apply to Mr. Robinson, South Kensington Museum).—R.—R. M.—E. H.—J. J. L.—J. H. M. (there are half a dozen equally good).—J. W.—T. P. (Britton's "Public Buildings of London").

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